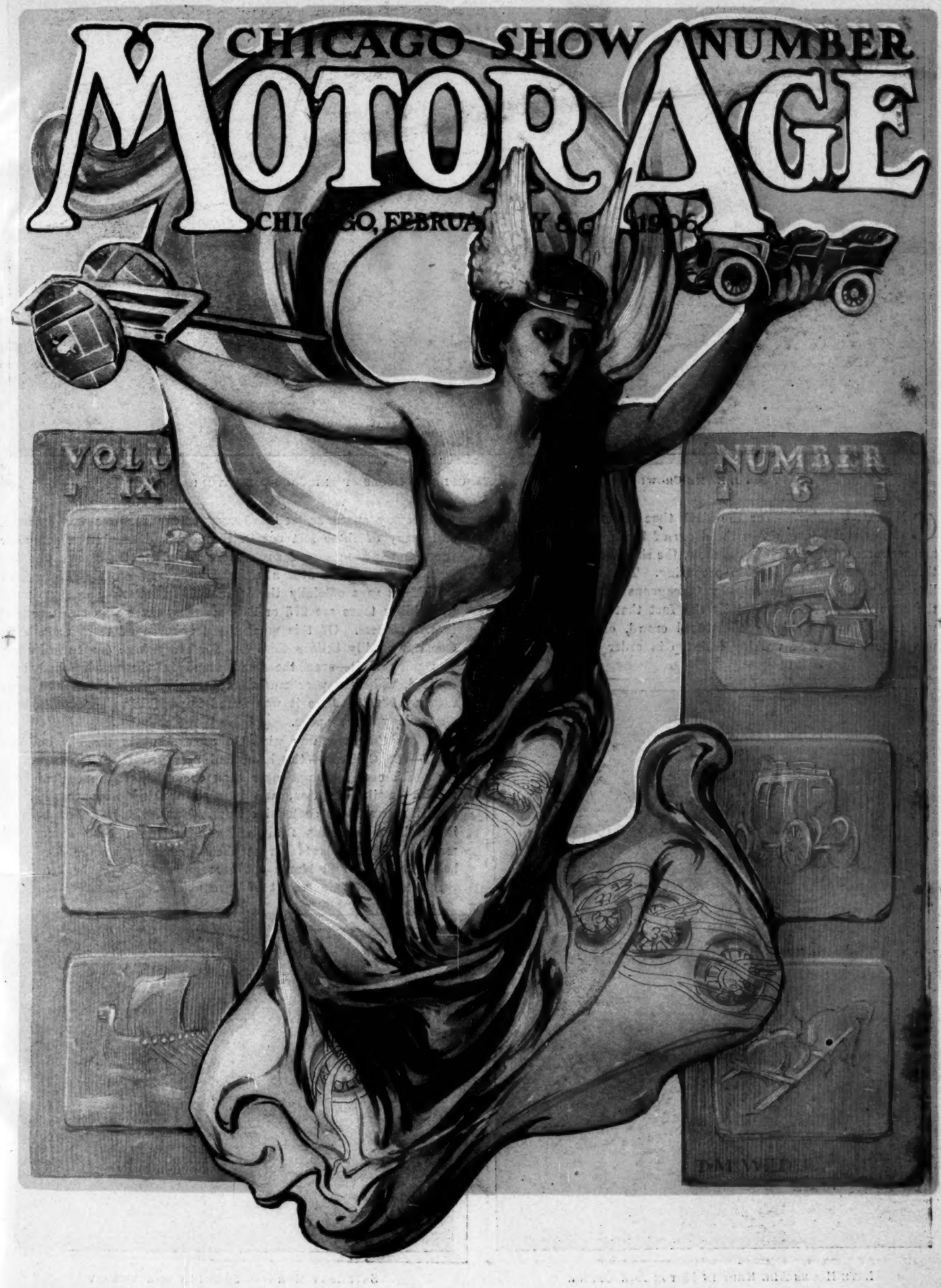
CHICAGO SHOW NUMBER
MOTOR AGE
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Great Mid-Country Show

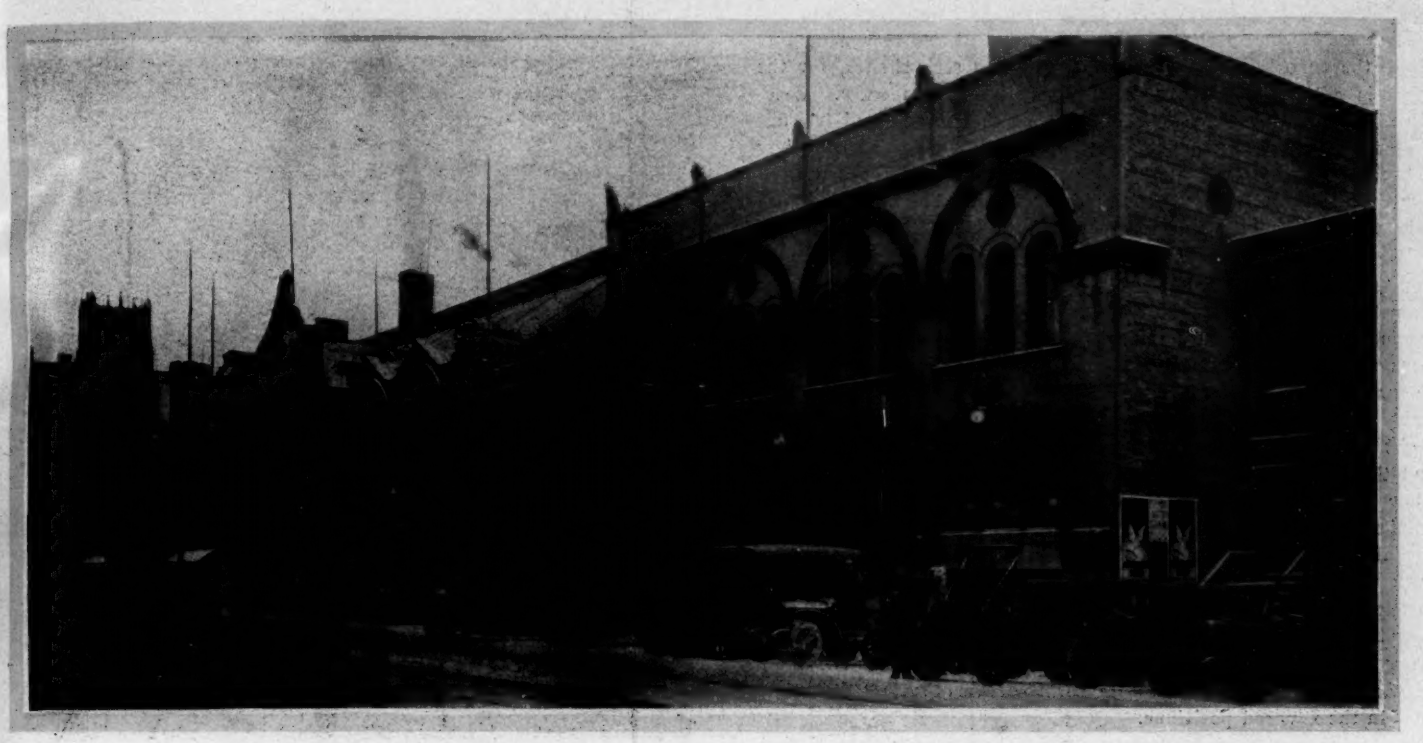
JUST BEFORE THE CROWDS STARTED TO SWARM AROUND THE DOORS OF THE COLISEUM SATURDAY NIGHT

CHICAGO, Feb. 3—For the sixth time in as many years Sam Miles stood just within the doors of the big Coliseum tonight and welcomed all Chicago to his show, the show he spends 11 months thinking over and 1 month in preparing. That his efforts in this line are appreciated not only by Chicagoans but by the trade of the country as well is shown by the fact that every aisle tonight was packed with a big, good-natured crowd, one so vast that it was almost a case of walking lockstep in order to make progress, while every space as well as every excuse for one was jammed, and many of those left out in the cold had sneaked under cover through the kindness of some more fortunate tradesman who has been able to crowd over a bit and let a few of the unfortunates in. Miles says officially there are 243 exhibitors, but that in all probability there are 275 or 280, counting those who have crowded in with others. Of this number ninety-seven of them make cars. One can readily believe this, too, for everywhere one turned there was an exhibit—even the band stand in the armory had been utilized, while the poor musicians furnished their toots from some faraway corner where it was found impossible to squeeze in even an apology for a space.

It was the same way with the annex, but in the big building itself—the Coliseum—the band had managed to hold its own in the north end, although more than one covetous glance had been thrown in its direction, and if such a thing were possible the musicians would be ousted instanter. But Miles is a firm believer in music as a means for keeping a crowd in good humor and making the attendants forget their weariness, so the big band holds its place and blares out at regular intervals, broken every now and then by a soloist of rare ability.

LATE HOURS ARE KEPT IN MOTOR AGE OFFICE

SATURDAY MORNING SCENE IN THE ARMORY

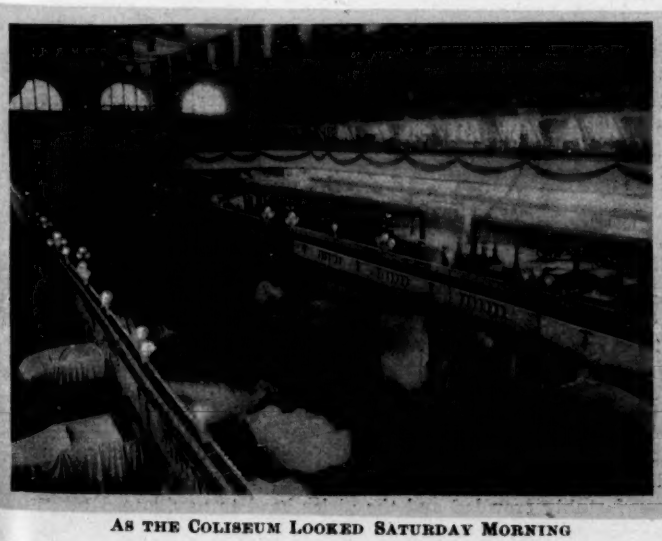


LONG ROW OF DEMONSTRATING RIGS LINED UP ON WABASH AVENUE READY FOR A CALL FROM THE COLISEUM

As for the show itself this one night alone is enough to convince the doubting that it deserves to go down into history as Miles' masterpiece, a grand affair which makes last year's effort, magnificent as it was, look like two-bits and a nickel, while New York with its garden with the cerulean blue canopy studded with stars and its armory with its martial apeparance, has certainly nothing on Chicago, while many think that for general effect the Windy city affair eclipses the effort of old Father Knickerbocker.

Miles sought Nature's aid when he designed his color scheme. He got the predominating yellow from the broad corn fields of Illinois and the subduing touch of green above from some shady nook where the tall grasses grow and wave, just waiting for a chance to inspire a genius like Miles. The green of the Coliseum does not quarrel with the stronger yellow—just harmonizes enough to make one feel that the enthusiastic critic who called it a "symphony in gold" hit the nail squarely on the head. Surely it was an apt summing up of the whole Milesian scheme—the gaunt, gray girders which grimly arch to the dome of the glass roof of the Coliseum almost hidden from view by graceful folds of green, while below on the stands themselves it is all yellow so far as the decorations go, and with the cars, of all the many colors of Joseph's coat, breaking into the scene, brought into greater prominence through the dark mission-like wood used in the construction of the stands, but everything blending so nicely that the general idea is the symphony in gold impression.

It all depends just which way you come the impression you get. If the armory entrance is chosen you approach a wind-swept porteullis, with a canopy running to the curb. Automobiles are everywhere, lined up along the curb or dashing up to the door to unload their occupants. Lights gleam from every direction, big lights, little lights, searchlights and side lights until one is



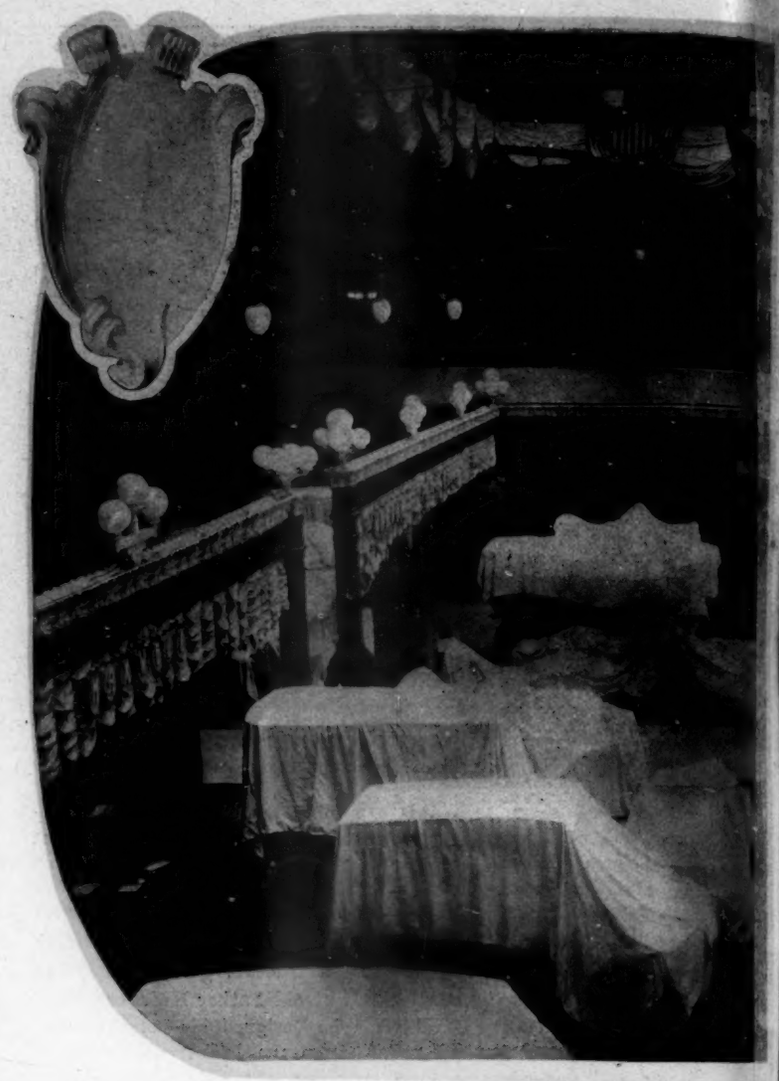
AS THE COLISEUM LOOKED SATURDAY MORNING

UNDER THE GLARE OF THE CALCIUM IN FRONT OF ARMORY

bewildered and wonders if by chance he has wandered into the switchyard of some railroad. The long lines of demonstrating rigs along the curb look forlorn while the drivers seek shelter, for the wind is cutting and the swirling dust worse than snow. Occasionally a horse-drawn vehicle pulls up at the armory and lets out people who act much as does one who goes to the shoe store to buy new footwear and tells the salesman to wrap the old ones up and send them home. These people look good to the attendants inside, for nine times out of ten they mean a sale.

Over on Wabash avenue it is different. The clanging gongs of the trolley and the antiquated cable vie with the squawk of the French horns and there is not the scurry and dash of Michigan avenue. Big limousines lumber up to the door of the Coliseum, frisky little runabouts scurry around much as does a torpedo boat at sea, while all lines converge to the one big entrance ablaze with light and promising a pleasing change from the wildness of the night outdoors. There are long lines in front of the ticket offices and the people keep coming for hours after the official 8 o'clock. They were still crowding in at 9:30 and it seemed that if some of those inside did not go home there would not be room enough for all. But somehow they all got in, and once in they stayed until the last dog was hung. They marched and countermarched through the Coliseum aisles, the women looked longingly at the cozy tonneau seats, and before the evening came to a close nearly every seat had its fair occupant, some of them weary but most of them glad of the opportunity to crow over the less fortunate ones in the favored positions.

As the rounds were finished in one building it was natural that the famous tunnel should furnish an outlet. Those in the Coliseum sought the armory and those in the armory hiked for the Coliseum through this natural channel—this sewer, as more than one termed it—a long wooden tunnel built along the west side of the alley connecting the two buildings. Early in the afternoon it seemed only a short dash from one building to the other, the channel being comparatively clear, but at night with a stream of humanity going in each direction it seemed as long as the Simplon tunnel in Italy. You'd start from the armory, for instance, jump across the wind-swept alley to the cavern-like entrance to the ditch above ground. Then the treadmill would start. You'd walk and walk



AS THE ARMORY LOOKED ON SUNDAY MORNING

TUNNEL LEADING FROM COLISEUM TO ARMORY

and walk until you'd think you must be somewhere near the river, then you'd look up and see, far ahead, the bend which denoted the turn to the Coliseum. Just about the time you'd begin to wonder if it wasn't about breakfast time you'd emerge into the annex of the Coliseum and the voyage would be over. But that channel is a bright idea and bridges a difficulty that at one time threatened to put the armory out of the reckoning in making up the show plans. Without it it would be impossible to coax the people to leave the Coliseum and walk a block to get to the other place despite all its attractions.

In reality the big show was supposed to open at 2 o'clock this afternoon. An hour before this it was all confusion. There was a jam out in the alley where the cars were coming in. Fest was here, there, everywhere, calming one impatient driver, jollying others and finally getting things running smoothly again. Up in the gallery there was more confusion. The people who had parts and sundries to install had put off the real work until the last moment as usual and while the majority of cars were in place on the main floors of both places, the two galleries resembled chaos. Of all the lot the Shelby Steel Tube Co. was the first to be ready for the serious business of the week.

No one, however, took that afternoon opening seriously. They'd been to shows before and they knew that the hour they were pointed at was 8 o'clock. So when the big doors swung open at 1:45 p. m. there was only a bare handful of people waiting outside—a crowd so small that unless you stood by the entrances you wouldn't know the show was on. Still, at that, the afternoon attendance was large enough to make one realize the buildings were comfortably crowded and the aisles hard to navigate.

LOOKING TOWARD FRONT DOOR OF ARMORY

But in the evening how different? Both big buildings were ablaze with a soft, subdued light which only carried out the symphony in gold idea the more—a pale, opalescent yellow that did not affect the eye and brought out the beauty of the whole scheme. The bands were going in perfect rhythm, fair women and men in evening dress thronged stands and aisles, the attendants, cleanly shaven, courteous and affable, stood ready to either take an order or explain some mechanical detail and the show was on. It was a far different scene that confronted one in the afternoon, for everyone was ready. Everyone? Well, no, for on the main floor of the Coliseum was a vacant space—Charles E. Duryea had not arrived. His is a prominent location, too, but so harmonious is the whole scene that one hardly realized until he looked up at the sign that the management had not left this one oasis for just the very purpose for which it was used—a resting spot for the weary. Fagged-out women sought the comfortable chairs and recuperated for another effort later on.

The foreign section is in the armory, which was another wise move on the part of Miles, who does not wish the latest addition to the show to be made secondary to the other building. That he has succeeded in this is clearly evident, for one finds the headquarters of Chicago's crack regiment as crowded as the Coliseum. People who look with awe on anything foreign in the way of automobile construction go here and view the polished chassis of the French productions and listen to the talk of how J. Pierpont Morgan has just bought a duplicate of this one, how W. K. Vanderbilt was so stuck on that one at the New York show that he placed his order for its mate, how Joe Leiter, the ex-wheat king, dropped in this afternoon and inspected a third, and all the other guff that makes a poor man realize the power of money. Even without its mate, the Coliseum, the armory could almost be classed as a complete automobile show in itself.

As is his custom after he has his show running, Sam Miles sought shelter in the press stand along about 9 o'clock. It is a quiet, restful spot, that press stand, located right above the main entrance to the Coliseum and effectually barricaded. Here Miles could sit calmly, puff away at his cigar and contemplate his handiwork. It must have given him a great deal of satisfaction, too, to look over the animated scene and realize that he had made such an exhibition possible. All kickers had been satisfied, the weather man had treated him fairly decent in stalling off the snow and the only cloud in Miles' sky was occasioned by a photographer taking a flashlight of the crowd entering the building. As the cloud of smoke drifted through the door and up in Miles' direction the master frowned a bit, but the brow soon cleared up as did the smoke.

"I guess if I don't have anything worse than that to worry me I ought not to kick," he said. "The only thing, though, is that it might scare the people. I've taken every precaution to obey the law in regard to the building and fire ordinances and I'd hate to have any slip now. I want to say right here that the city officials have been extra nice to me. They told me I would have no trouble if I minded the ordinances, and I have found this so. They have shown every disposition to meet me half way.

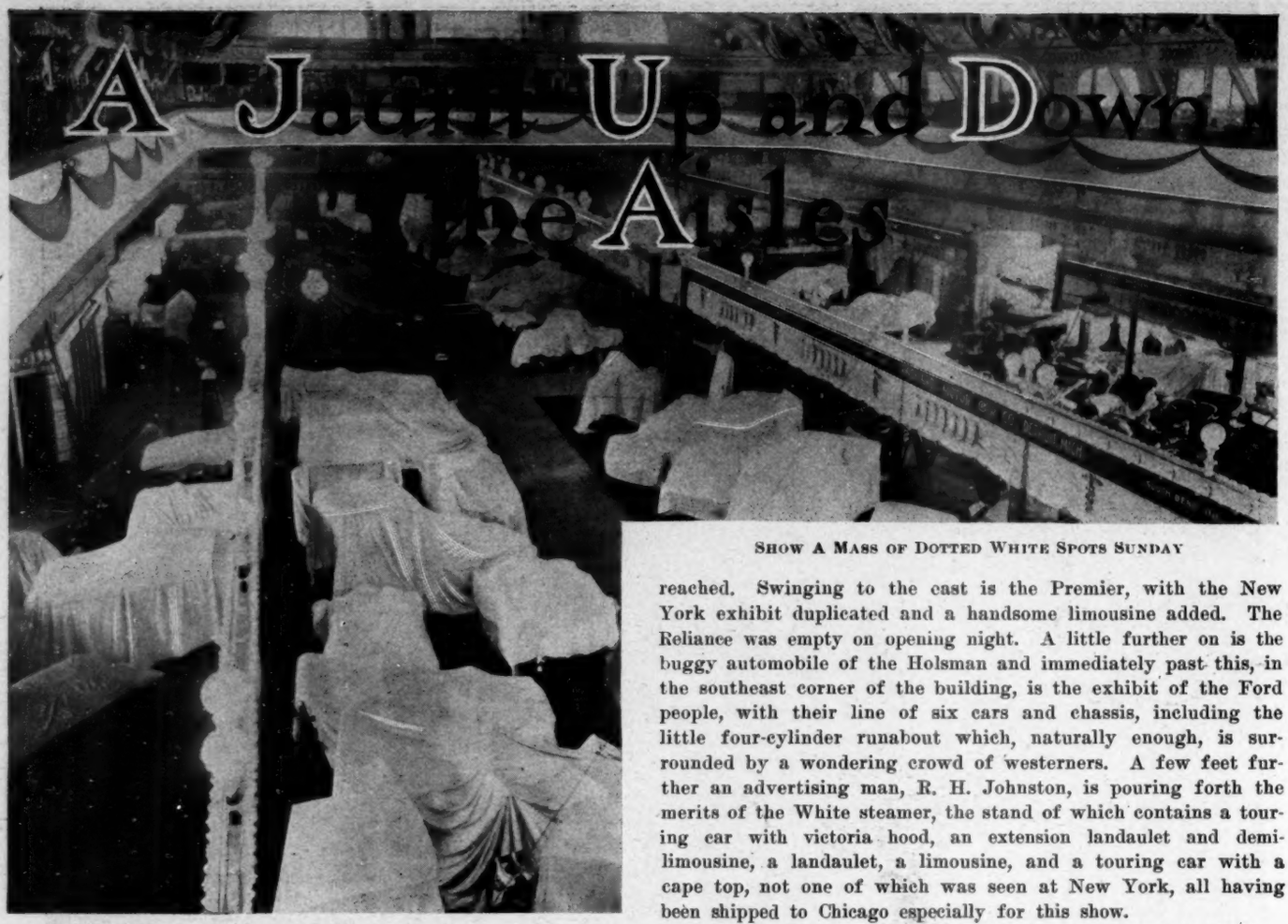
"But it's a grand show and I don't have to take off my hat to even little old New York. In fact, this show is almost as large as the two New York affairs put together. The Coliseum has nearly 10,000 square feet of space more than the garden, and I guess the armory will offset the A. C. A. building. You couldn't get any more exhibitors in if you wanted to. While I haven't taken any census as yet, there must be at least 400 cars in the two buildings, allowing four on an average for each of the ninety seven manufacturers of automobiles. What more could you want? And this show is going to be a business-maker. The agents are coming here prepared to buy, as they have always done in the past, while the opportunity for cultivating this great western field is one that the industry cannot afford to overlook."

ONE OF THE MAIN AISLES OF THE COLISEUM

As the Coliseum Looked a Few Hours After the Doors Were Thrown Open for the First Time

GENERAL VIEW OF THE COLISEUM ONLY A LITTLE WHILE BEFORE THE OPENING HOUR ON SATURDAY

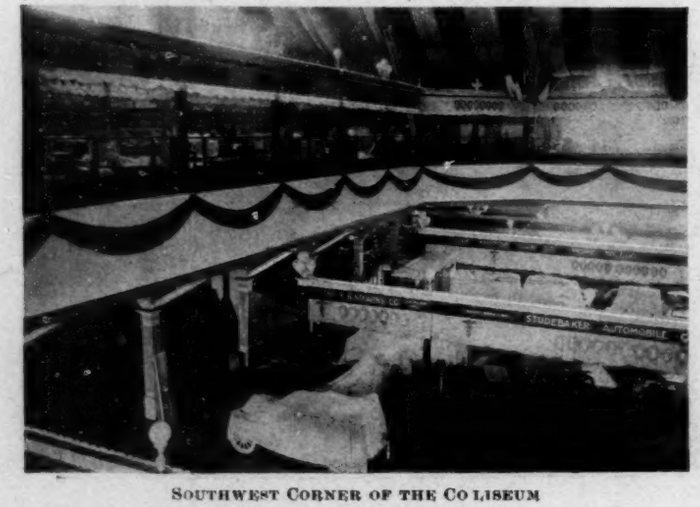
A Jaunt Up and Down the Aisles



SHOW A MASS OF DOTTED WHITE SPOTS SUNDAY

The average visitor to the Coliseum is in a natural state of bewilderment immediately the main entrance is passed. He hardly knows which way to turn in his desire to make the rounds of the show. To do this systematically, he would turn immediately to the right and feast first upon the exhibit of the Haynes Automobile Co., with its two polished chassis and its two touring cars to the left, and the exhibit of the Wayne people to his right, which contains the complete Wayne line, including the big 50-horsepower four-cylinder car. Then he passes along and views the Orient exhibit with the little buckboard the center of attraction. Immediately across the way is the large space occupied by the Peerless Motor Car Co., which contains a limousine, a couple of touring cars, a runabout and a chassis. A little further on the Glide, built at Peoria, Ill., is reached. Swinging to the east is the Premier, with the New York exhibit duplicated and a handsome limousine added. The Reliance was empty on opening night. A little further on is the buggy automobile of the Holsman and immediately past this, in the southeast corner of the building, is the exhibit of the Ford people, with their line of six cars and chassis, including the little four-cylinder runabout which, naturally enough, is surrounded by a wondering crowd of westerners. A few feet further an advertising man, R. H. Johnston, is pouring forth the merits of the White steamer, the stand of which contains a touring car with victoria hood, an extension landaulet and demi-limousine, a landaulet, a limousine, and a touring car with a cape top, not one of which was seen at New York, all having been shipped to Chicago especially for this show.

The Pierce Great Arrow is a neighbor of the White, with two limousines, two touring cars and a chassis; while, in the northeast corner of the building, is found the Franklin, with its complete line. Along the north wall, with a canopy formed by the gallery, are three large and interesting exhibits. First, the Cadillac, with its line of six cars; next the Royal, with a limousine, a touring car, a demi-limousine and a chassis; and, last, the Apperson outfit, with chassis containing the two sizes of motors; a limousine, the side entrance car with top, and an open car. This exhibit also has in it a new model of the Apperson, which is none other than a 90-horsepower runabout colored in gray and having rakish lines all through. The visitor swings to the left and encounters the Winton exhibit on the left with four cars of model K, but with as many different bodies; and on the right, the Corbin, with a table of parts, a chassis, a nifty-looking runabout and a touring car with top. Adjoining the Corbin exhibit is the Baker, with four handsome electric machines, and immediately across the aisle is the Autocar, with a little runabout much in evidence, there being a chassis and a complete car in this model and samples of both sizes of the four-cylinder machine.



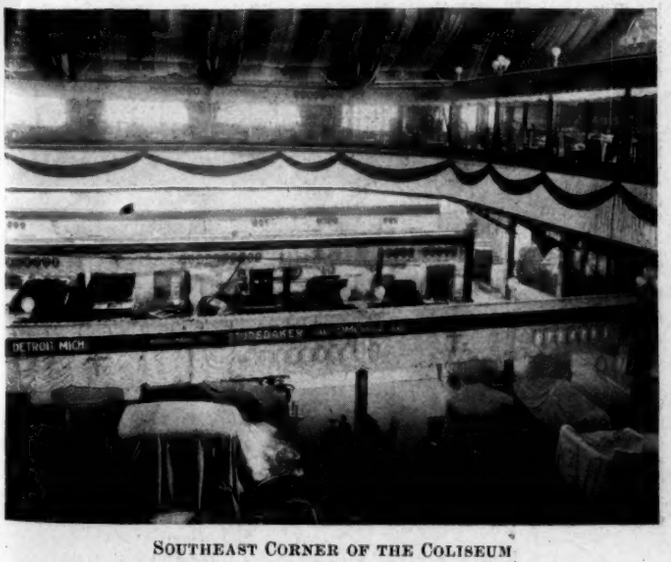
SOUTHWEST CORNER OF THE COLISEUM

Swinging into the center aisle eastward the beautiful polished chassis of the Packard Motor Car Co. backed up by a new four-cylinder runabout decorated with white ribbons and surrounded by other cars, including a limousine and two tourists, meets the visitor's eye. Immediately across this aisle is the largest exhibit of the entire show, that of the various Pope companies, which includes not fewer than seventeen cars in all, among them being ten in the gasoline type, five electric, an electric delivery wagon, and an electric truck. Across from the Pope stand is the Studebaker, with four electric, two chassis and two touring cars and the Stearns company with two large cars and a chassis. The last two exhibits adjoin and extend through from aisle to aisle, giving ample space for visitors. Heading northward to the right is the St. Louis with its one chassis of the 40-horse-

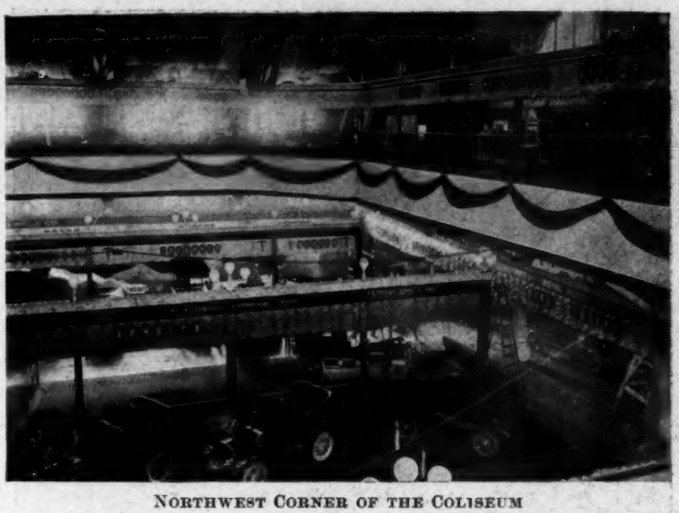
power car and two touring cars, one of 32 and the other of 40 horsepower. Passing up the aisle the visitor encounters the Locomobile outfit with a large display, not the least interesting of which is the Thomas racer driven to third place by Joe Tracy in the Vanderbilt cup race. Near by are samples of the complete Locomobile line, including a beautiful and highly polished chassis. The Olds line across the way is well divided between cars for pleasure and cars for business, four of the latter being among the number, with the little straight and curved runabouts in the background, but still conspicuous enough not to be unnoticed.

The visitor now passes straight north and reaches the exhibit of the Elmore, where is found a four-cylinder chassis and two completed cars, one of the three-cylinder and the other the four-cylinder pattern. Across the way the Rambler display is found, which is conspicuous, not in the number of cars shown, but rather by the absence of a superabundance of cars. The exhibit includes a couple of surreys, two four-cylinder models and a limousine. Just across the way is the Knox, somewhat crowded because of the presence of four or five large trucks, which rather hide the pleasure cars, consisting of the complete Knox line. The visitor swings around to the left and passes through the stand of the Stevens-Duryea, where he sees the four-cylinder car with its three-point suspension and the six-cylinder of similar design. Immediately to the south is the Thomas Flyer with a stand full of the one model, but with a number of different bodies and a handsome chassis. Along the west side of the extreme eastern aisle beginning with the north end is the Northern with its two and four-cylinder touring cars, its little runabouts and the two and four-cylinder chassis. South of this is the Woods exhibit with a line of six electric rigs, including an electric chassis, certainly a novelty in exhibitions; a beautiful red leather-lined limousine and a gasoline touring car, which, to express the opinion of a visitor well versed in the game, is the equal in appearance of any machine made. The National has its home across the center aisle to the south and is complete with five rigs including the four and six-cylinder cars. The Maxwell adjoins the National on the south and exhibits both a chassis and completed car in the runabout and touring models, while at the end of this line is the Mitchell with its attractive proposition in the $1,000 four-cylinder car, and several samples of this being shown as well as the larger model and the delivery wagon.

Winding up at this point of the building the visitor stands at the door of the main floor of the annex and turning to the right comes in contact with Chicago's largest car, the Tincher, which, when it first made its appearance some years ago, with air brake, was a decided sensation. The massiveness of the Tincher naturally attracts attention, the exhibit consisting of a limousine and a touring car. To the west is the steam rig of the Chicago Automobile Mfg. Co. and across the aisle is a large



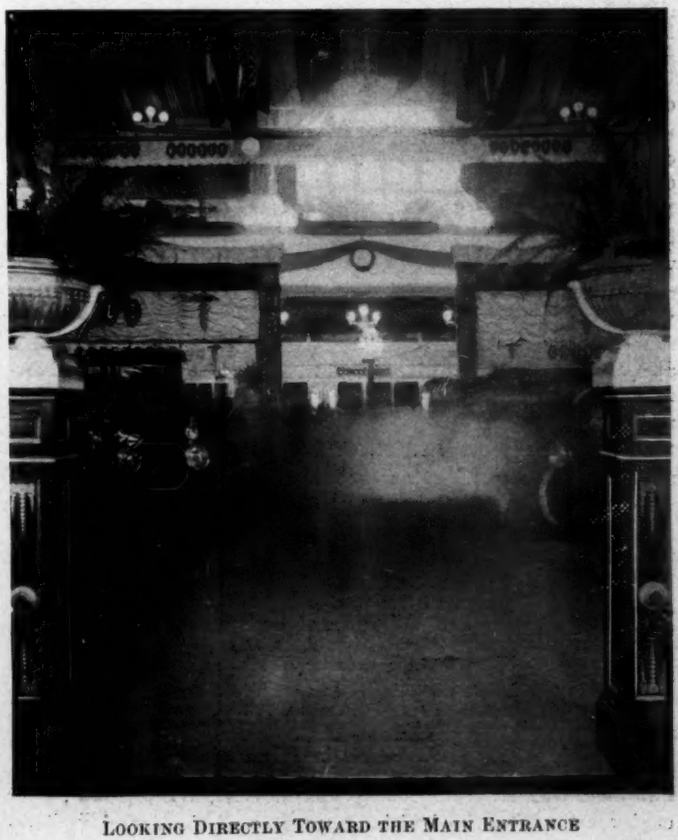
SOUTHEAST CORNER OF THE COLISEUM



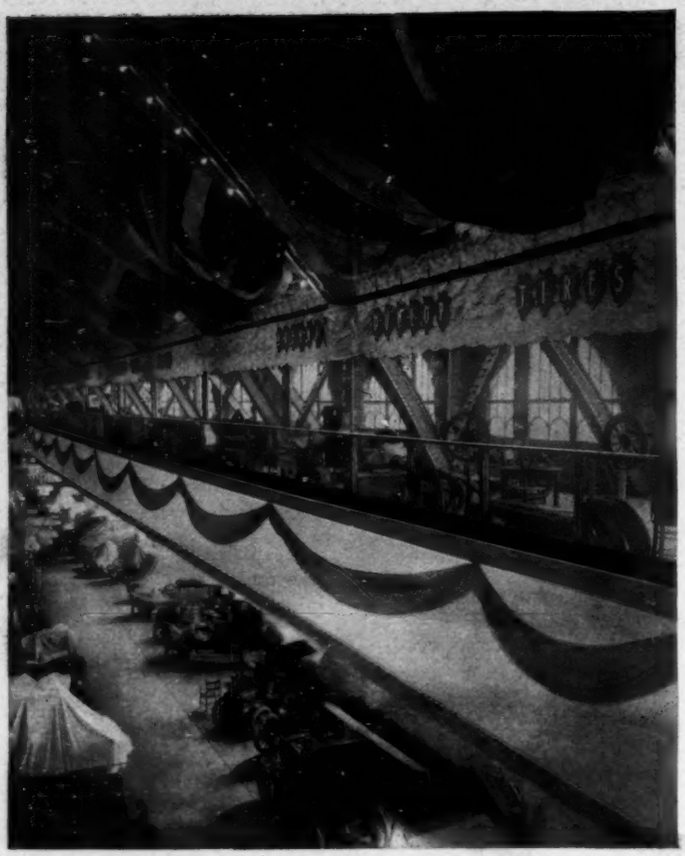
NORTHWEST CORNER OF THE COLISEUM

exhibit of Buick cars. The Austin occupies the west end of the middle section with its complete line and the southwest corner of this portion of the building, covers the Welch. The big line of the Vehicle Equipment Co., which was slow in reaching its place, is to the eastward of the Welch. Across the aisle and to the northward of the Vehicle Equipment Co. is found the Pungs-Finch and the Auburn with its one complete car and a chassis. The Nordyke-Marmon Co. is tucked away in a little southeast corner of the annex and the Jackson and Pierce-Racine companies are found in the end of the middle section.

A trip through the passageway from the Coliseum annex to the armory takes one among the foreign exhibits as well as some productions from America. The very first car to be met upon entering the armory is the Buckeye at the left and the Panhard, exhibited by Ralph Temple, on the right. A few feet east is found the Renault and the Delaunay-Belleville. Adjoining this is the Daimler chassis. Across the way H. S. Michaels holds forth with the Clement-Baird and if this car is not the best in the show no one could convince Mr. Michaels of the fact.



LOOKING DIRECTLY TOWARD THE MAIN ENTRANCE

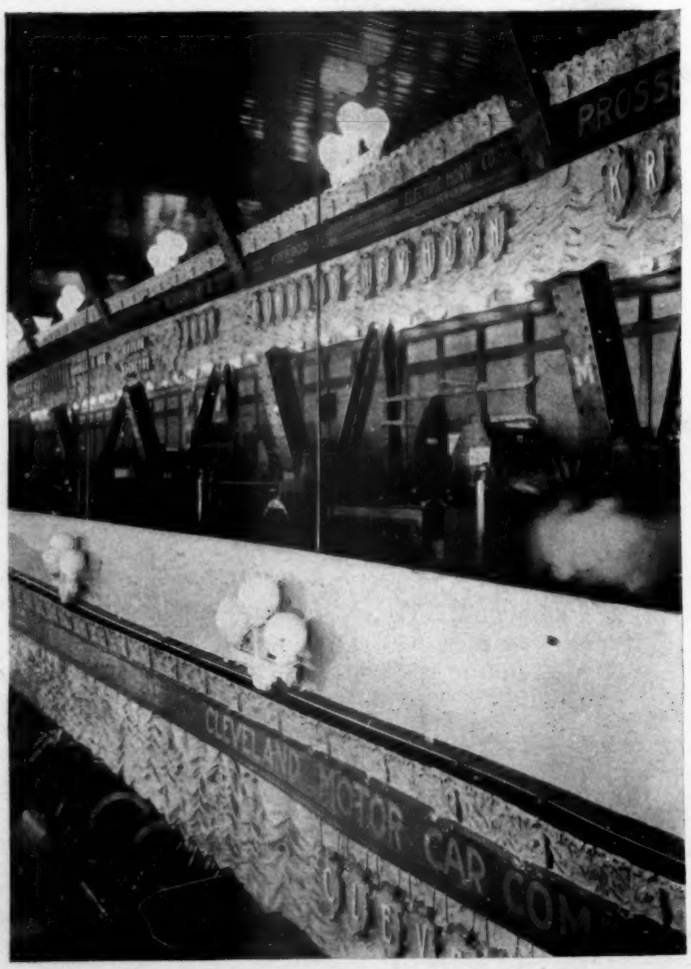


EAST SIDE COLISEUM GALLERY, LOOKING NORTH

Passing eastward to the left is found the American-made Berleit car, to the right the Babcock electrics in all varieties. A little further on is the Hotchkiss and the De Leon and across the way the English Daimler. Adjoining the last named is the tasty exhibit of the Cleveland Motor Car Co. and to the right is found the Gale line. To the extreme east and immediately in front of the main entrance the Stoddard-Dayton is tucked away, though it is the first exhibit upon entering from the Michigan avenue side. Passing on to the south the visitor meets the McCrae trucks, the Adams-Farwell, with its three-cylinder and new five-cylinder cars. Swinging to the right, one passes the Soules commercial wagon, the American motor truck exhibit, the Rainier company line, Kansas City, another product of the west, and the Queen, ending with Chicago's most recent production, the Silent Knight. The outer aisle is finished when the Frayer-Miller has been reached on the right and Smith & Mabley's big line on the west, making strong displays of automobiles.

The armory has a central aisle, however, which extends westward from the main entrance and bordering on this are to be found the Dolson, the Acme, Rapid, Lozier, Maxwell-Briscoe, Reo and Moline. Then the visitor tramps back through the subterranean passage to begin his round of the gallery of the Coliseum which contains every conceivable device used in motoring other than the completed car itself. The visitor enters from the east stairway and sees Kingston carbureters, Solar lights, Fisk tires, Veeder speed and distance recording instruments, Weed chain grips, Atwood lamps, Pennsylvania, Hartford and International tires, McCord lubricants, Dietz lamps, Jones speedometers, Charlie Splitdorf's line of sundries, Hyatt bearings, Apple ignition outfits, Morgan & Wright tires, Shelby tubing, Columbia lights, Whitney chains, Auto sparker with Pat Dasey amusing himself by turning a little wheel; Diamond tires, Bowser tanks and Sprague tops. With all this he has completed only the east side of the gallery. In the northeast corner the Detroit Motor Car Co. displays its line of sundries, and passing along the north aisle to the westward the visitor sees displays of Republic tires, Pantosote leather, Auto Coil ignition devices, Wray pumps, Thor engine and parts, the ignition apparatus of the American Electric Novelty & Mfg. Co., the Hill Precision oiler, Briscoe radiators, McGiehan odometers, Valentine varnishes, Chicago ignition batteries, National dry cells and samples of the products of the Midvale Steel Co. Not the least interesting of this section is the exhibit of the Gabriel Horn Mfg. Co. consisting of the many sizes of the Gabriel horn and the Foster shock absorber, which is displayed in section. Turning to the left one starts down the west aisle to the south, passing stands where he sees the displays of the Firestone tires, Tokheim tanks, Remy magnetos, Schwarz wheels, Standard bearings, Warner instruments, samples of Standard oil, Brown dust shields, Prest-O-Lite gas tanks, Sta-Rite plugs, Harris and New York and New Jersey lubricants, Warner's gears and differentials, Diamond chains, Swinehart's tires, Long radiators, Spicer's universal joints, Brown-Lipe gears and Stearns devices, Baldwin chains and Timken bearings. A turn to the left brings the visitor in touch with Goodrich and Goodyear and G & J tires, and Never Out and Gray & Davis lamps, at the stand of the latter being the ever renowned Gov. Castle. On the other side of this aisle Wheeler holds forth with his Schebler carbureter. A little further on is the Hartford-Theffault suspension device, the Consolidated Mfg. Co., the Oliver Mfg. Co., the Webb Co., the Edmund & Jones Co., and tucked away in the extreme corner are a few bicycles of the Fowler-Mamson Co.

A few steps takes one into the gallery of the annex which has its own band and its own soloist in the line of amusement and a conglomeration of cars and parts. The Whitely castings and Standard lamps are found as one turns to the right, and now come the displays of parts by the Beckley-Ralston Co., the magnetos of the Knoblock-Heideman Co., some beautiful samples of the bodies made by the Limousine Carriage Mfg. Co., storage batteries of the Universal company and the Joseph Dixon Crucible Co. exhibit. Across the aisles are Cullman sprockets and differentials, and the Pneumatic Tire Protection



NORTH SIDE OF THE ARMORY GALLERY

WEST SIDE COLISEUM GALLERY, LOOKING NORTH

Co. device. Under the orchestra stand is the London Auto Supply Co. with splendid samples of modern folding tops, a large display of parts by the Automobile Supply Co., the Madison-Kipp Lubricant Co., the Hedgeland axle, Sampson leather tires, Vesta ignition patterns and the Vesta electric horn, and a large display by the Motor Car Equipment Co. of parts and sundries. Along the south side of this portion of the annex are the displays of the Duplex Coil Co., Duff Mfg. Co., Manhattan Storage Co., Railway Appliance Co., and the Excelsior Supply Co., the last named consisting of every conceivable part there is known in the business. A little further on is the Continental Caoutchouc Co., National Press Corporation, Imperial Brass Mfg. Co., Cook's Railway Appliances Co., North Chicago Machine Co. and the Volta Battery Co. To the east is the Dayton folding tonneau and the Hendee Mfg. Co., with the Indian motor cycle. Along the extreme eastern wall are to be found the Gaulois tire, Dac Auto Supply House and samples of paint by the Sherwin-Williams Co. The central section of the gallery is taken up by the Gearless Transmission Co., which has a chassis fitted with an electric motor to demonstrate the working of the gearless transmission. Adjoining this stand is A. C. Banker with the E. H. V. Co. Compound. Next is the American Motor Car Co. exhibit. Following this comes the Columbus buggy display of four electric rigs, then the Dorris car and chassis, ending on the corner with the device of the Pneumatic Tool Co. and its car. The Mercedes Import Co. has its exhibit on the south side of the main section and passing eastward the visitor sees the Grout gasoline car, the Harrison Wagon Co. exhibit, the new Windsor car, the displays of the Detroit Auto Vehicle Co. and the Aerocar Co. Another trip downstairs through the subway takes the visitor into the armory again for the round up of the gallery section of this portion of the show. Beginning with the northeast corner and passing westward, Thomas Prosser & Sons show the Krupp line of metal parts. Further on is the Hutchinson electric horn, the Kinzie Mfg. Co. with its radiator and carbureter, Cramp & Sons, Parsons bronze parts, the Tripp, Heinze & Look electric displays, the Hotchkin anti-jolt device, the Baker gear and the Teal Mfg. Co. Along the western side are to be found the Culver Novelty Co., Ventilated Cushion Co., a novelty in St. Anne Kerosene Motor and Reading motor cycles. A little further on are the exhibts of P. Reilly & Sons, Hensel Storage Battery Co., Lang & Lyon, the Adams & Elting Co., the Electric Rubber Mfg. Co. and the Hancock Mfg. Co. The visitor starts eastward for a final round up and passes the stands of the Speed Changing & Pulley Co., American Lamp Co., Auto Accessories Mfg. Co., Turner & Fish, Bethlehem Steel Co., Eugene Arnstein, MOTOR AGE, Way Muffler Co., Hicks Speed Indicator Co. and the American Agency of the Michelin Tire Co.

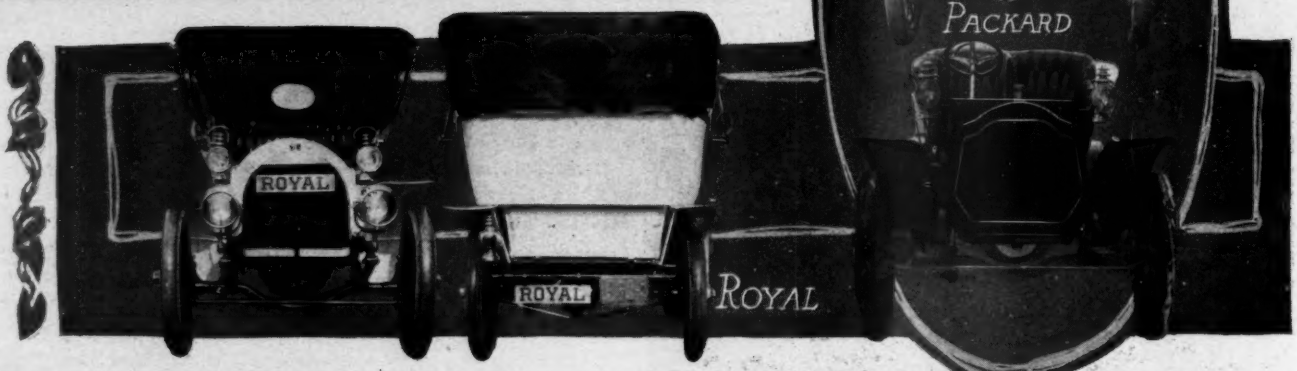
This ramble through the show is an interesting one for those who have taken in the bicycle shows, for the old guard is represented in nearly every booth. There is L. W. Conkling, who officiated for so many years as starter of the Pullman road race and now with the Packard people; Tom Hay, who formerly made Outing bicycles, on the Ford stand with Louis Block and R. P. Rice, ex-cycling notables; William Herrick, organizer of the Century Road Club of America, with the Peerless; Fred Patee, former chief consul of the Illinois Division, L. A. W., in the Cadillac camp; Ralph Temple, once a racer and later a big bicycle dealer, on half a dozen stands at the same time; Herb Githens, once a cycle champion and still pushing G & J tires; William Montague Perrett, formerly a Dunlop man and now Diamond tires; Charles E. Duryea, once a bicycle maker and now a car manufacturer; E. C. Bald, successor to Zimmerman as cycling champion, with the Columbia forces; Earl Kiser, once some pumpkins on a wheel and now with Winton; A. J. Nicolet and Dan Canary, former trick riders, with Temple and Michelin tires, respectively; the Whites, all of them once mixed up in the bicycle manufacturing game; E. C. Renuschaw, once with Featherstone and now Reo; L. J. Ollier, who used to talk Sterling bicycle and now with Temple, and Jim Levy and Lou Geyler, Autocar advocates, once prominent as racing men and later as salesmen.

SOUTH SIDE OF THE ARMORY GALLERY

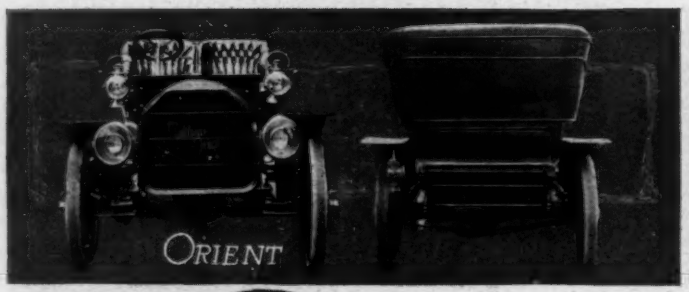
Fronts and Backs

NATIONAL

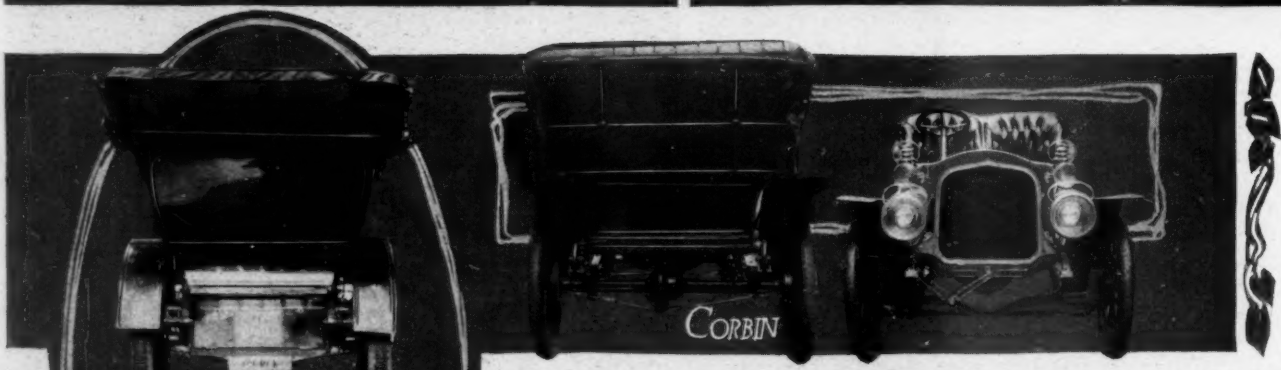
PACKARD

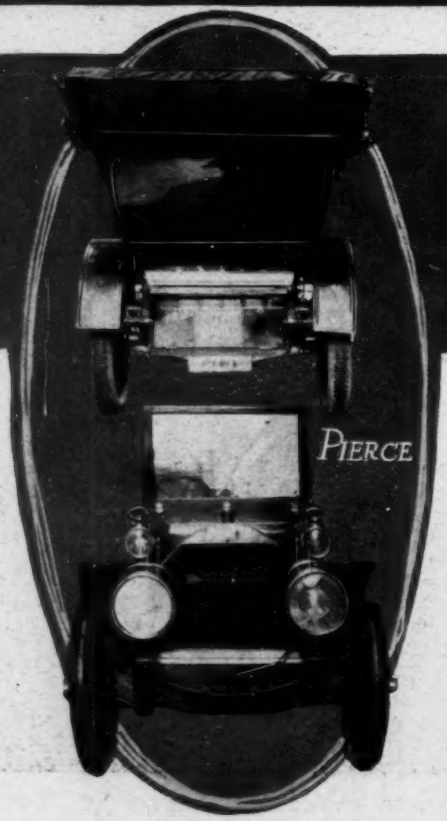


ROYAL


ORIENT

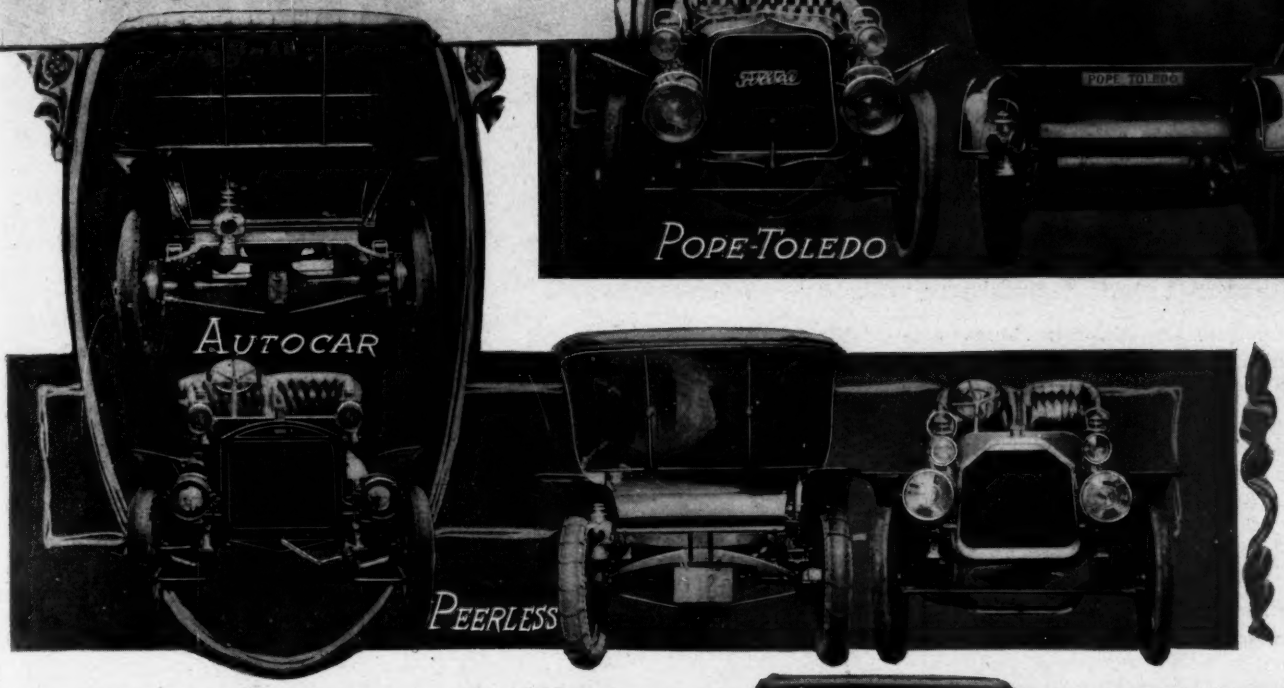
STEARNS

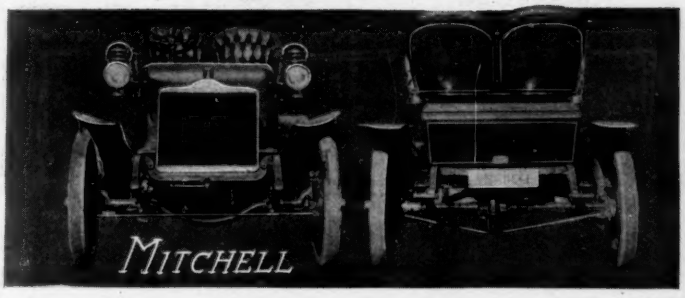

CORBIN

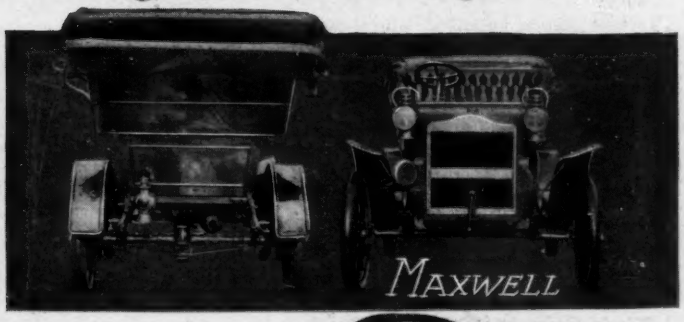

PIERCE

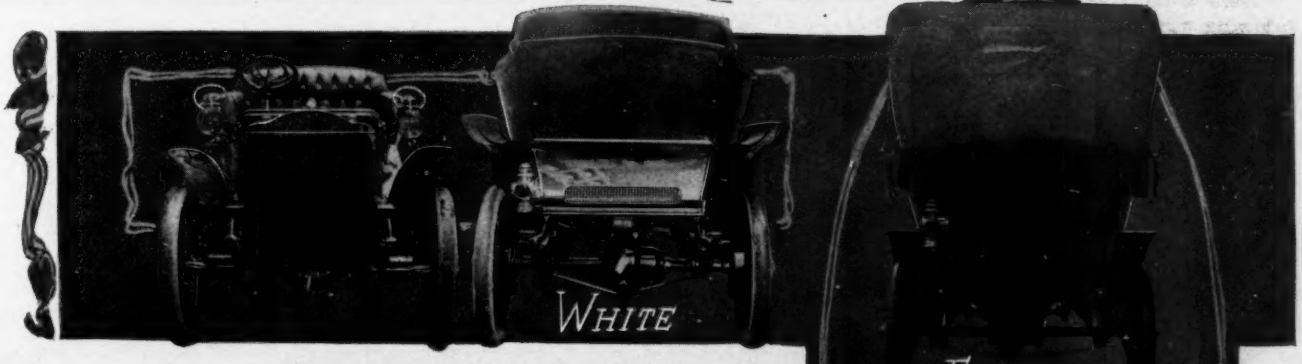
OLDSMOBILE

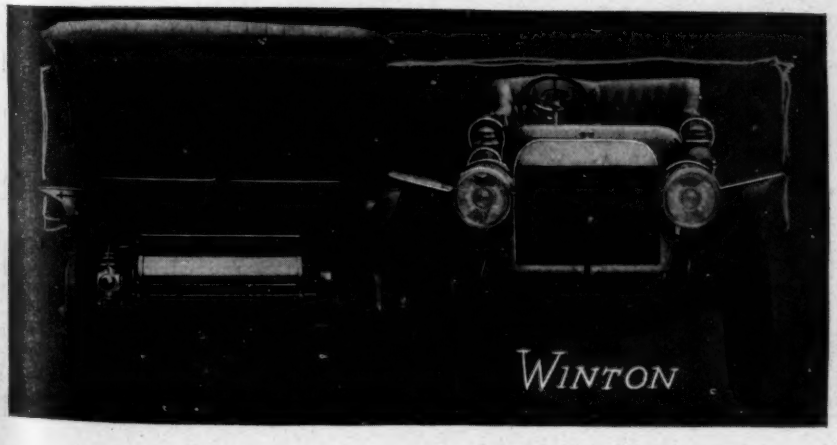
# of Modern Cars











BRIEFS OF THE SHOW

Colonel Sprague shows his tops in a practical manner. He has made two tonneau frames out of gas pipe, fitted a top to each and inside is his office.

A. J. Banta has eighteen people on the Locomobile stand, and even at that finds no leisure time on his hands.

The waterproof qualities of Pantasote is demonstrated by an aquarium made of imitation leather, in which several gold fish and a bunch of tadpoles swim around.

The three men whose accidents caused the death of track racing are at the show—Barney Oldfield with the Peerless, Earl Kiser on the Winton stand and Webb Jay at White headquarters.

E. C. Bald, now a 200-pounder, is on the Columbia stand and tells his friends the Electric Vehicle Co. may build him a racing car next summer in which he will fight for honors in the Vanderbilt.

A count of the two buildings shows sixty-three makes of cars in the Coliseum and its annex and thirty-six in the armory. The Mercedes is not in the foreign section in the armory, being located on the second floor of the annex.

As at New York, the Baby Reo is attracting a great deal of attention. So far 4,995 kids have beseeched their parents to buy it, but Assistant Sales Manager Rueschaw assures the scared parents that the Baby Reo output for 1906 is sold.

Herb Githens is not in the lamp business. The lamp he is showing was caused by Herb's haste to get the G & J exhibit in shape. He stepped on the business end of a stick and the other end promptly flew up and whacked the tire man under the left eye.

Early birds Monday morning enjoyed a unique sensation going through the tunnel. The lights had not been turned on and a black cat was an albino compared with the darkness of the yawning hole above ground. One explorer secured a French horn and a cigar and equipped this way made the voyage without bumping into the stream of humanity going the other way.

With only one space in which to display their huge 5-ton truck the Synnesvedt people were stumped for a time to find room to turn around. Finally they converted the platform of the truck into a second story and used it for an office.

"This show already excels previous ones," said Assistant Manager Fest on Tuesday. "Monday's attendance showed a 60 per cent increase over the same day last year, while so far we have sold twice as many agents' tickets as we did a corresponding period a year ago."

DRIVING A BARGAIN ON THE OUTSIDE

One of the athletic celebrities at the show is on the Northern stand, where Dan Boone, fresh from the University of Chicago football team, is in attendance.

John F. Palmer, inventor of the Palmer bicycle tire, and who has an automobile tire on the stocks, is a visitor at the show.

Some one wandered up to the Peerless stand and asked for Barney Oldfield. "Out," said William Herrick. "Probably find him down at Winton's scratching Earl Kiser's wooden leg."

Wandering around the biuldings is a man who is giving some of the Seldenites a scarce with a story of a car that was built 'way back in the '80's, which had clutches and other contraptions.

The Packard polished chassis has been purchased by Mrs. F. A. Fuller, of Paris, France, for $7,000, and after the Boston show will be fitted with a body which is now being made by Rothschild, of Paris.

Ralph Temple flutters around like an old mother hen, his chicks consisting of the Reo, Premier, National, Panhard, de Dietrich and Hotchkiss. It takes a force of seventy men to look after the interests of these cars.

F. E. Moskovics, formerly general representative of the Continental Caoutchouc Co., begins his active connection at the show with Brandenburg Brothers & Alliger, selling agents, he having accepted a membership in the firm.

The Four Wheel Drive Wagon Co., of Milwaukee, was frozen out and could not get space. Therefore the people from the Cream city proceeded to keep in the limelight by putting three or four demonstrating rigs into commission out on Michigan avenue.

Charles E. Duryea and his exhibit blew in Monday, with a long string of photographs which are used to prove Duryea's claim to being a pioneer. The veteran said that when he arrived in Chicago Saturday and did not find any snow he thought he had been dropped off in the wrong city. It was not until the beautiful started in Sunday that he recognized the place. Then he lost no time hurrying his exhibit into place.

J. L. Couzens and Frank Kulick, of the Ford company, were among the late arrivals Monday. With them came the demonstrating rigs, which were immediately put into commission. The runabout is in great demand and booked far ahead.

Barney Oldfield came Monday, bubbling over with race talk. The Green Dragon's master says he will drive in any contest that holds out financial inducements and is still strong in his belief that as long as the public will support it track racing will continue.

Tom Cooper subbing for him in the play, "The Vanderbilt Cup," now running in New York.

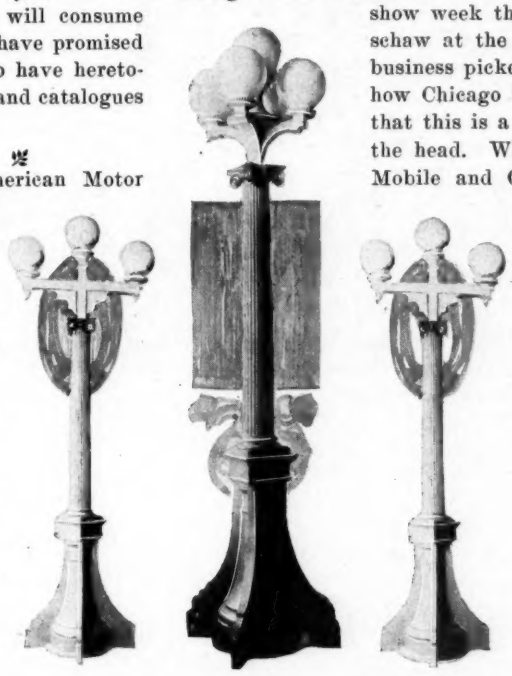
C. A. Hawkins, winner of the recent California endurance run, is on the White stand and keeps visitors interested with his tales of the victory of the steamer in this big coast event.

Many of the exhibitors employ detectives. This precaution is not taken because it is feared anyone will run away with a car, but some of the parts on exhibition might be lifted by persons with light fingers.

Stillman G. Whittaker has lots of fun with the Baldwin shock absorber, the merits of which he is exploiting at the show. The veteran has a little buggy body with a strong pair of springs. It is equipped with a shock absorber and in the rig sits a big doll. As long as the absorber is on Miss Doll sits serenely, but with it off and when Whittaker gives the springs a good pull out shoots the doll, forcibly illustrating the worth of the absorber.

G. A. Wahlgreen, of Motor Field, Denver, is in attendance at the show talking up his scheme of a transcontinental automobile train for the early exhibition of 1907 models. His plan includes a trip from the Atlantic to the Pacific in a train of vestibuled baggage cars, with Pullman and diner attached. It will start about September 1 from some point in the east, making from 1 to 3-day stops at some twenty-five of the leading trade centers of the country. The trip will consume about 8 weeks and many prominent firms have promised to take part. In this manner dealers who have heretofore been reached through correspondence and catalogues will see the real thing and profit thereby.

Isaac B. Potter, president of the American Motor League, is in attendance at the show to look after league matters, and incidentally to take in a few members. "The league membership is growing rapidly and it will not be long ere the A. M. L. will be the only motoring organization of the country," said Mr. Potter. "We are working hard to give members something for their money and the members are now appreciating this effort. The A. M. L. is the only organization founded on right principles, and, on this account, you may rest assured it will keep at the top of the heap, where it is today. But we want members, we want thousands of members; we want every motorist in the country in the fold, and when we have this we will have an organization so strong that our rights will be guaranteed in every way."



Announcement was made at the headquarters of the Chicago Automobile Club that the deal with Hetty Green had fallen through and that the club could not get the desired lease on the property at 243 Michigan avenue, which will necessitate a further search for a new home.

Those shields used to form the letters in the signs caused a slight sensation Monday when it was discovered that the A had fallen down from the sign of the Adams company and it read "Dams Farwell." Another peculiar reading was discovered in the gallery of the armory where the close proximity of Eugene Arnstein's exhibit to MOTOR AGE'S booth made it read from the main floor: "MOTOR AGE cement."

Chicago's weather man promised no snow for the rest of the season. Then it was up to Sam Miles to produce a bunch of tickets. The general manager of the show was too busy to talk to the weather man and kept putting him off on the ticket proposition. Then the weather man saw the game and turned on the snow lever and let a little of the beautiful fall, just to teach Sam Miles a lesson and incidentally to keep up Chicago's reputation during show time.

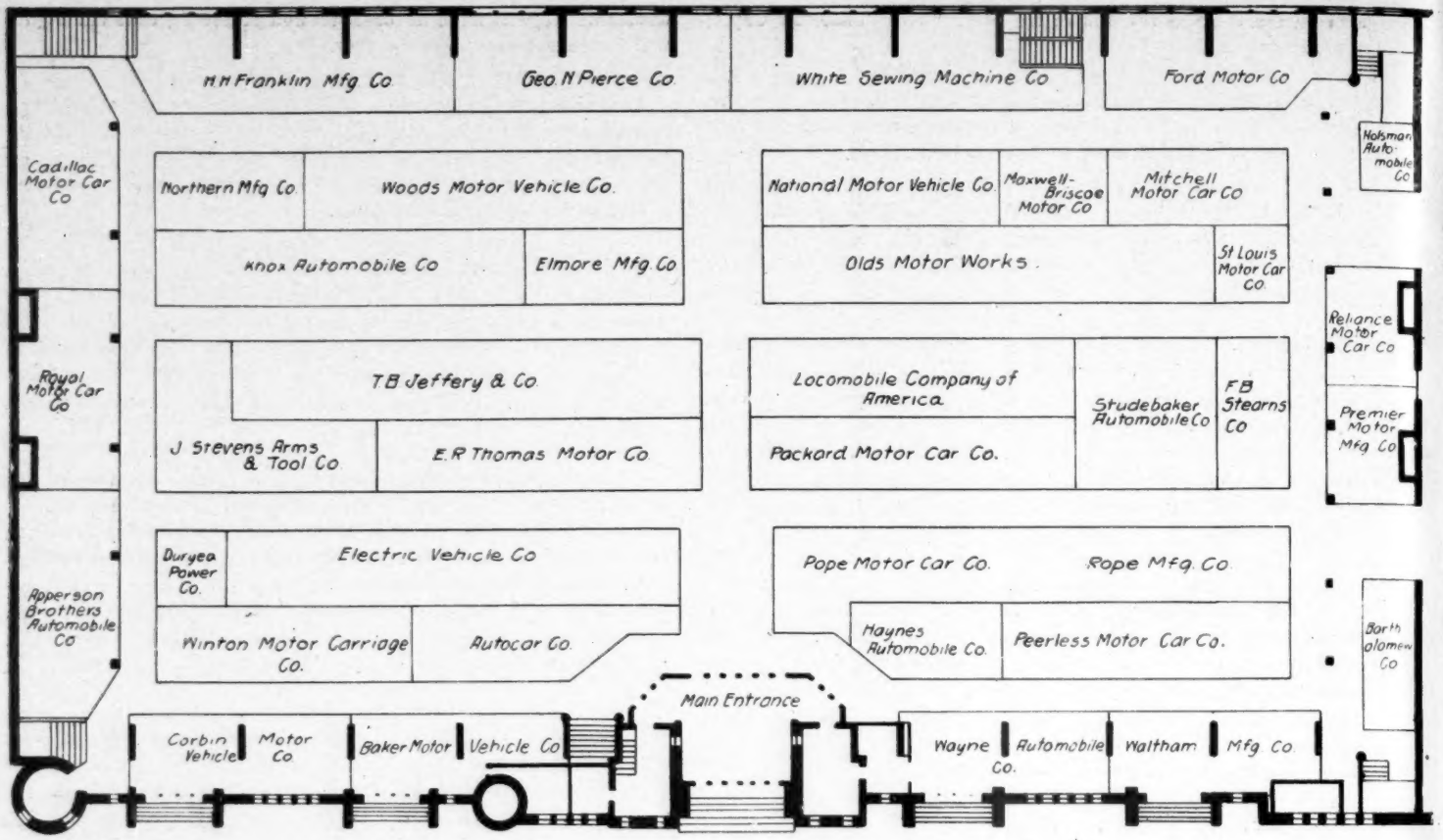
"We did more business the opening day of the Chicago show than we did in New York on Monday, Tuesday and Wednesday of show week there," says Assistant Sales Manager Reuschaw at the Reo stand. "In New York, though, the business picked up wonderfully. I have yet to find out how Chicago will tote up, but I guess the claims made that this is a business show just about hits the nail on the head. Why, we have agents here from Salt Lake, Mobile and Oklahoma, all anxious and eager to do business and I think that we will have all we can attend to."

Carl Fisher, of Indianapolis, bought an airship at the New York show and both at the eastern exhibition and the Chicago affair came in for all sorts of jollying from his friends. The official song of the Dragons is as follows:

Everybody works but Fisher,
And he flies around all day;
He bought himself an airship,
And in it sailed away,
The airship got a puncture,
And down poor Carl he fell;
Fisher is now in heaven—
He is like ——

TOTAL NUMBER OF CARS DISPLAYED AT THE CHICAGO SHOW, 366

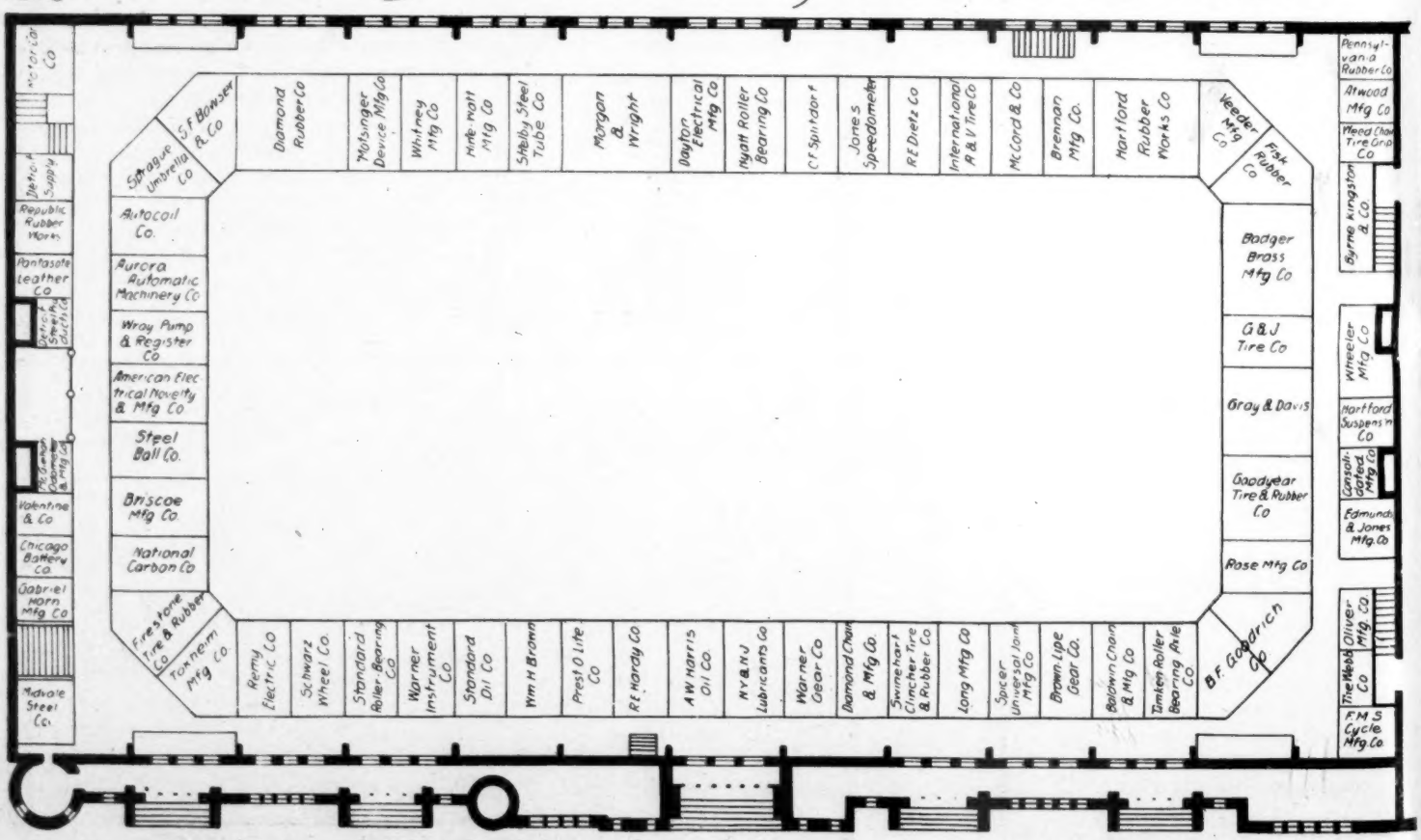
Total number of vehicles exhibited, including pleasure rigs, chassis, electrics and commercial wagons	366	Friction drive with double side chains	9	Four cylinder, vertical	208
Gasoline cars	222	Rope drive	2	Six cylinder, vertical	6
Gasoline chassis	67	Runabouts	37	One cylinder, horizontal	12
Foreign pleasure cars	11	Touring cars	141	Two cylinder, horizontal	55
Domestic pleasure cars	211	Limousines	34	Four cylinder, horizontal	1
Gasoline commercial cars	20	Landaulets	4	Miscellaneous	9
Foreign chassis	9	Miscellaneous	6	Electric pleasure cars	34
Domestic chassis	59	Air-cooled	42	Electric commercial cars	8
Double chain drive	90	Water-cooled	267	Electric chain drive	22
Single chain drive	46	One cylinder, vertical	1	Electric gear drive	17
Shaft drive	171	Two cylinder, vertical	14	Electric shaft drive	3
		Three cylinder, vertical	3	Steam cars	7
				Steam chassis	1

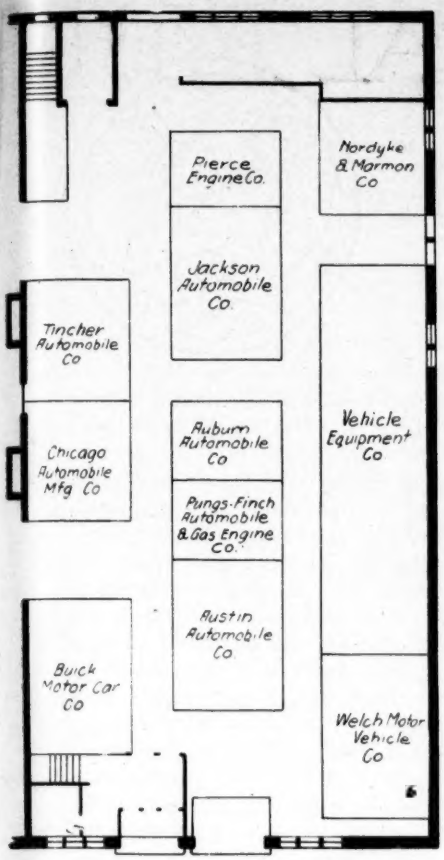


Main Floor of the Coliseum

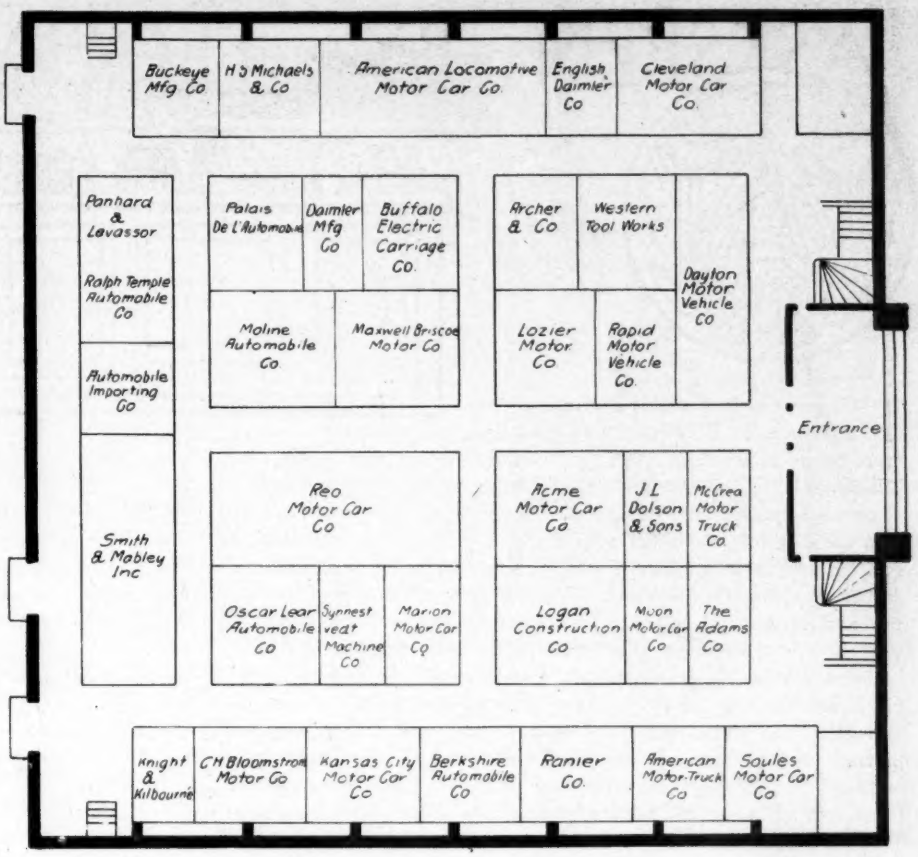
EXHIBITORS AT THE SIXTH

Gallery Section of the Coliseum





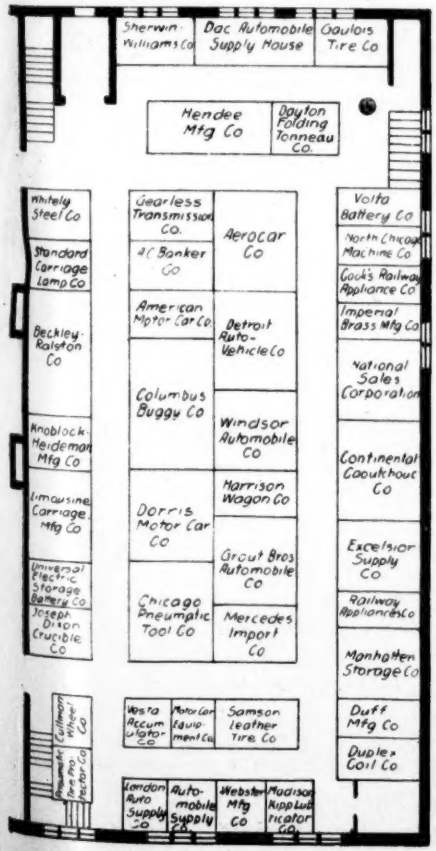
Main Floor
Coliseum Annex



Main Floor
First Regiment Armory

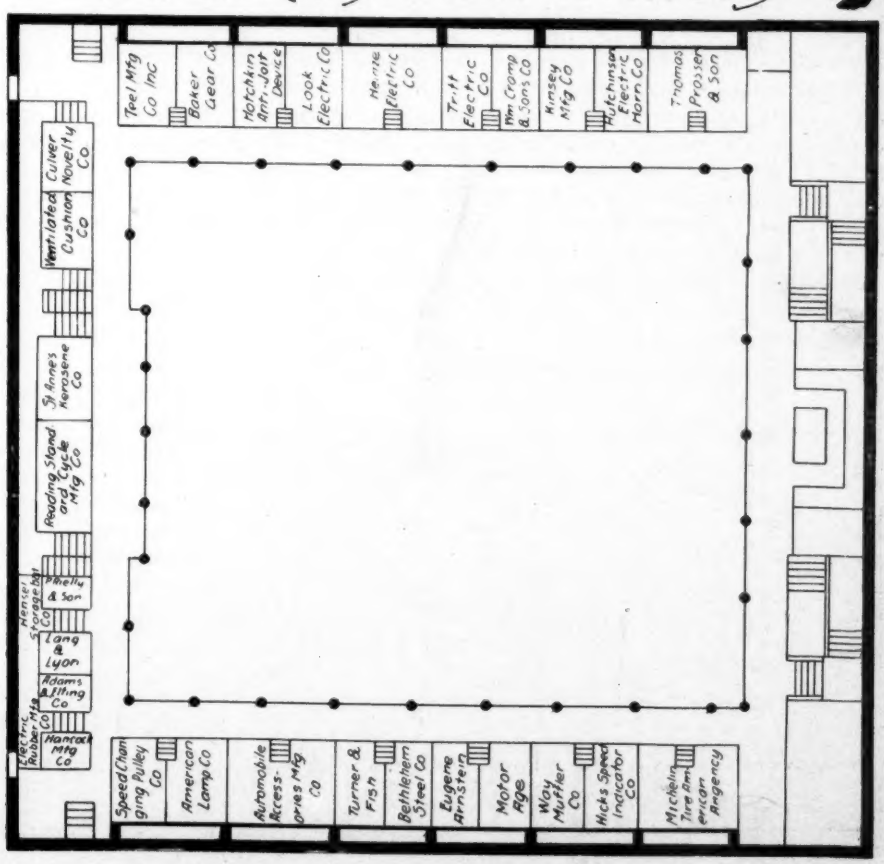
ANNUAL CHICAGO SHOW

Gallery Section
Coliseum Annex



Main Floor
First Regiment Armory

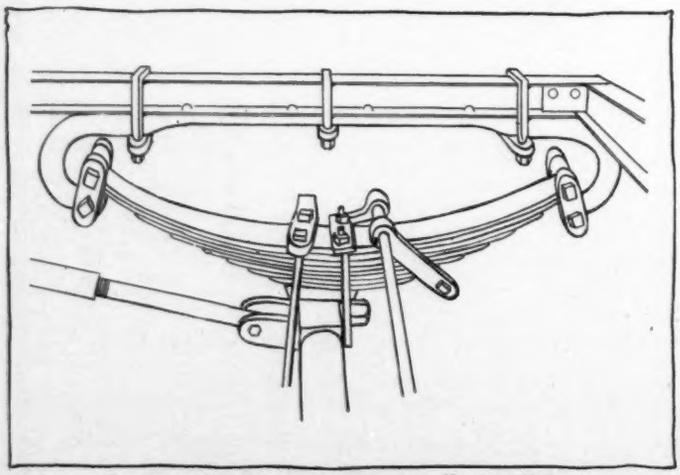
Gallery Section
First Regiment Armory



AS SEEN BY TECHNICAL EYES

THE great west has laid her offering at the shrine of Inspection, and the hosts from the Mississippi to the Golden Gate and from the Mississippi to the Alleghanies have come to examine and if acceptable, possess the machines. True it is that western built cars are few in comparison with the cars built in the large central and eastern factories, but it is not all to the great central manufacturing cities like Buffalo, Cleveland, Detroit, Indianapolis, and the numerous small towns. The wave of manufacture is on its westward flow, and high grade cars, replete with interesting details, are now a reality. In the past the Mississippi has been the western limit, but this season Kansas City has placed the line of demarcation one stage nearer the calm Pacific, and it is a safe prediction that at the next coliseum automobile show further pioneering in the manufacturing line will be evidenced from the great west. One of the new faces at the coliseum show, the Silent Knight car, is the subject of much comment by the wise heads of the engineering world, who are being introduced to the reciprocating sleeves within the cylinders, which in uncovering and covering ports serve to eliminate poppet inlet and exhaust valves. Besides this leading innovation it has numerous other special designs. The Adams-Farrell—a Dubuque revolving cylinder machine—is on hand in touring car lines and with a double clutch sliding gear set operating on the selective principle. To these can be added the already well known lines of Ramblers, Mitchells, the several new St. Louis products, such as Dorris, Moon, American Mors and others, and the hosts of small cars now being built throughout Illinois, Wisconsin, Missouri, and Iowa.

The four-cylinder Northern car, with all its cylinders made in a single casting, is replete in new construction ideas, nearly every one of which appeals to the casual as well as the critical observer. The placing of the spark plugs and priming caps in small pocket pieces that screw into the side of the cylinders is something out of the ordinary. While many car builders were striving to secure a spherical combustion chamber and the making of the spark as near the center of this as possible in order to get a quick and complete combustion, this concern has apparently yoked the cart ahead of the horse and placed the spark in a very small pocket. The argument advanced for this is that the explosion is actually quicker than where the spark occurs in the open combustion chamber. Reasons for such are not general, but it is commonly accepted among engineers that such is the case. Another novelty in this motor is the general use of air pressure, it being resorted to as a force for engaging the clutch and also for applying the brakes acting within the rear hubs. On the rear of the motor is a plunger air pump driven from the crankshaft and which maintains high pressure in a reservoir. From this a piping conducts the air to an opening in the front end of the crankshaft, which is bored throughout its length. Air is conducted through it and forces the clutch members together. To disengage the clutch an outlet valve is required. In applying the brakes recourse is had to a small air cylinder on the right frame piece. Within the cylinder is a single-acting piston with its piston rod connected to a lever on the brake rod. Air is admitted into the rear end of the cylinder, the action being the same as that used on railroad cars.



PECULIAR SPRING ATTACHMENT IN KANSAS TRUCK

GLASS WIND SHIELD IN REAR

The six-cylinder Stevens-Duryea goes contrary to custom, and incidentally introduces a new fashion, by placing a glass wind shield on the rear of the front seat, which is obviously intended only for the benefit of the rear seat occupants. The shield is much lower than those used on the dash and is supported solely through brackets on the back of the seat.

CUTTING OFF GAS AND SPARK

In the four-cylinder two-cycle Elmore an individual and original method of cutting off the gas and cutting out the spark from each cylinder is used. On the front of the dash are four knife switches. Connected with these are four arms with rods coupling with control valves in the intake pipes to the cylinders. On the rear of the dash are four levers working in slots through the dash. By raising a lever the spark is cut off by opening the switch. The gas is cut off by closing a valve close to the cylinder.

EXTERNAL CAMSHAFTS ON THE TINCHER

One of the many makers this season to adopt external camshafts, those carried outside of the crankcase, is the Tincher concern. This motor, which has many points of individuality, has two camshafts, one for the intakes on the right and another for the exhaust valves on the left. Each of the four cams on each shaft is enclosed in an aluminum pocket, the lower portion of the pocket being a funnel-like receptacle in the side of the crankcase with an opening through into the interior of the case through which the splash can pass to lubricate the cams and camshaft bearings. This pocket has its top cut to an angle of 45 degrees to the vertical. Over this lower pocket fits an upper part with a globular lower portion and a cylindrical top part serving as a guide for the pushrod. This part has a ground fit with the lower portion and has its bottom cut at 45 degrees to adjust itself with the bottom part. On the camshaft, threaded onto the bushing at each side, is a nut with coned portion adapted to fit over the casing parts and lock them together. These nuts can be tightened or loosened with the hand or a spanner wrench. In order to make the camshaft readily removable, the shaft is not made continuous to the half-time gear in front,

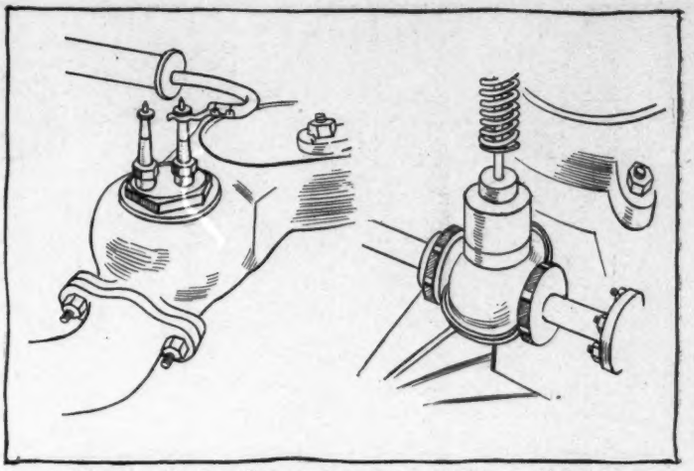
but terminates in a small flange which faces a similar flange on the part of the shaft carrying the half-time gear, so that by removing the four cam coverings and taking the six bolts out that unite the flanges the camshaft can be raised out. In the Tincher 80-horsepower racing car double spark plugs are placed vertically in the caps above the inlet valves. Both plugs are connected up with the same electric system so that a double spark is obtained within each cylinder, the result being, as claimed by the maker, an increase of 20 per cent in the power generated. A switch is provided by which one or both sparks can be used.

PECULIAR ROCKER ARM TYPE

Perhaps the most peculiar type of rocker arms for opening the inlet and exhaust valves shown so far this season is that used on the Jackson model D car, in which a two-cylinder motor with opposed horizontal cylinders is carried crosswise beneath a forward bonnet. In this motor, rated at 20-24 horsepower, the mechanical inlet and exhaust valves are carried vertically in the top of ports on the cylinder ends, the inlets being to the front and the exhausts behind them. The rocker arms are longer than the entire cylinder, extending, as they do, from the center of the crankcase to the center of the ports. They are pivoted on a cross rod supported on a pillar carried on the cylinder wall close to the crankcase. The outer end of each arm is flattened where it rests on the top of the valve stem, which, by the way, ends in a large circular flange sweated to the top of the stem. In the other end of the stem is a short adjusting screw with lock nut. This screw bears upon a very short pushrod, which has a roller on its lower end bearing directly upon a cam on the camshaft carried in the top portion of the crankcase. The flywheel is in front of the motor, and the entry of the inlet and water pipes is shown.

INLET VALVES IN AUTOCARS

One of the several car builders to adopt the style of placing the inlet valves directly in the center of the cylinder heads is the Autocar Co. The exhaust valves are carried in side ports and are actuated by vertical lift pushrods, whereas the inlets call into service overhead rocker arms with pushrods rising at the sides of the cylinders and raised by the exhaust camshaft. The novelty in the inlet valve is that the part of the rocker arm bearing on the valve stem is entirely encased in a covering which holds the valve cage in position. To one end of this cover is connected the intake pipe from the carbureter, and in the opposite end is the rod on which the rocker arm is pivoted. This casing is held in place by a pair of side bolts and cross piece resting on the top of the casting. In removing the valve, the intake pipe is detached, after which the yoke is swung out of position, the outer casing lifted off and the valve cage taken out. A second point to attract the eye in this motor is the scheme adopted in the branching of the intake pipes. The

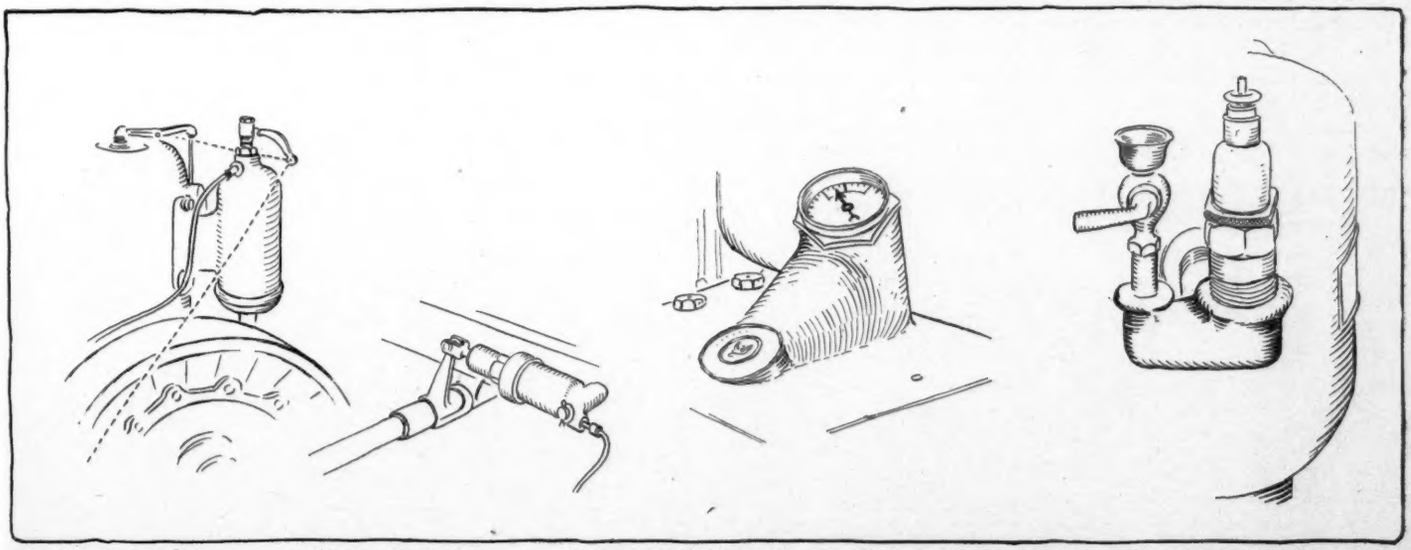


TINCHER DOUBLE PLUG SCHEME AND CAMSHAFT HOUSING

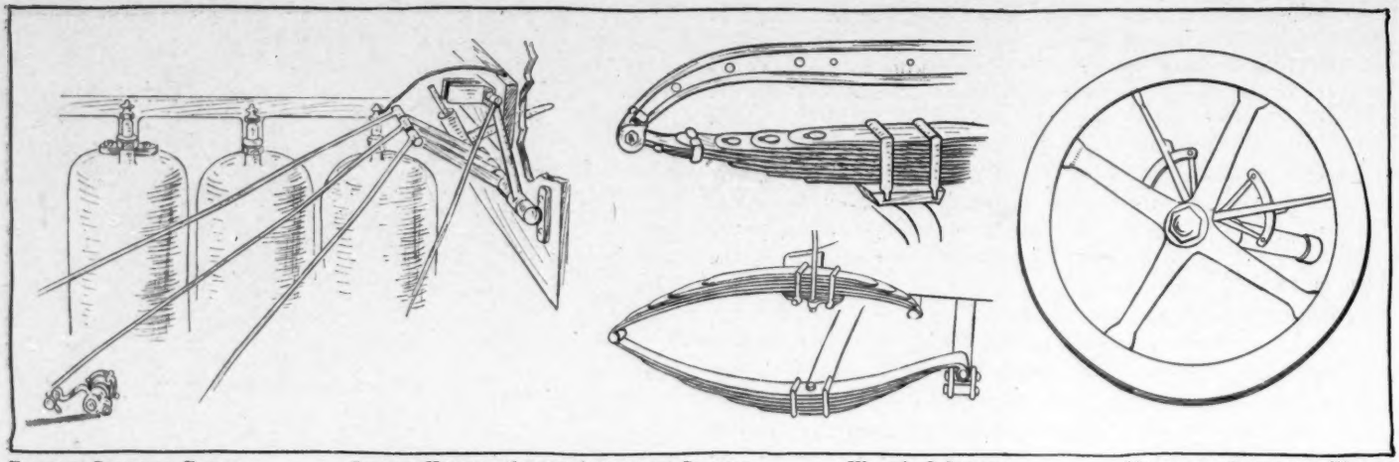
carbureter is carried low at the side and rising from it is a vertical pipe which, after reaching the level of the cylinder heads, connects with four radiating branches, one to each cylinder. All four are of the same diameter. The pair going to the end cylinders is of the same length as is that pair to the middle cylinders. A five-port union serves for connecting the pipe from the carbureter with those to the valves.

IDEAS IN CHICAGO CAR

Several changes in the design of steam motors for automobile use greet the eye in a review of the new Chicago steamer, shown for the first time. The motor is a four-cylinder one with the cylinders cast in pairs and the pairs mounted at 90 degrees to each other, like the arms of a V. In each cylinder is a single-acting trunk piston, with the steam admitted on the top side. Admitting steam and exhausting through a port on the upper side of the cylinder heads calls for a peculiar valve operating design. The intake valve, of large diameter, is in the top of the port. In the bottom of the port is a much smaller exhaust valve. Both are operated by pushrods. In doing this the intake valve is made with a small stem working within a sleeve stem of the exhaust. In accomplishing the lift two pushrods are used, one with a cross arm on top for opening the exhaust and the other with a direct lift for the intake. Both valves have beveled seats and resemble the poppet valves used in gasoline motors. One camshaft carried in the angle between the pairs of cylinders serves for opening all of the valves. In the rear of the motor is a gearset, in which a ratio of three to one and another of six to one are gained. The propeller shaft for final drive to the back axle is relieved of strain through a pair of torsion rods which diverge from a flange on the front of the differential housing. These rods are held in sockets at the rear and have a pivoted connection at the front, with lugs on a bracket on a



AIR PUMP BRAKE CYLINDER NORTHERN FEATURES CRANKCASE OIL GAUGE SPARK PLUG POCKET



ELMORE CONTROL RODS — SILENT KNIGHT SHOCK ABSORBER SPRING — WOOD'S C SPRING — MITCHELL STEERING WHEEL

dropped cross piece of the main frame. Where the rods pivot they are yoked and contain a coil spring within the yoke arms which allows for variations in length occasioned by compression of the springs. In additon to serving in this capacity the diverging rods further give aid as a brace to the propeller shaft and the rear axle.

EQUALIZES EXTERNAL EXPANDING BRAKE

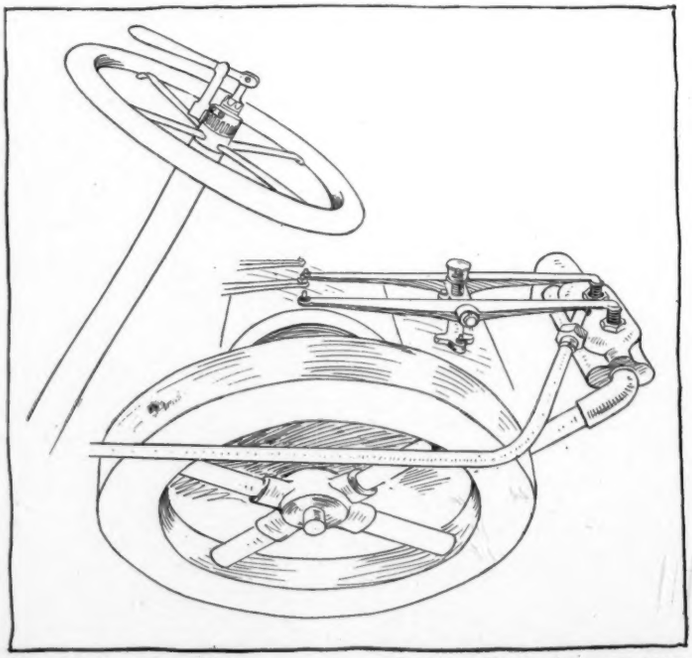
On its electric, as well as gasoline models, the Woods concern makes use of a simple and efficient equalizer for the internal expansion brakes operating within the rear hubs. Attached to a frame cross piece are four small pulleys, two near the center of the cross piece and the others at the end of the cross piece, so the cables passing over them are carried outside of the side pieces of the frame. The forward ends of the cables from the brakes are attached to a single tree, from the center of which is a short cable connecting with the pedal. Pressure on the pedal results in an even pressure being exerted on each brake. The brakes are made with ductile steel drums and fiber-covered expanding shoes. Any slack in the cable is taken up at the brake arm. The cable is attached to a bolt threaded into the end of the brake arm and nut; a lock nut on this permits of any adjustment. The cable used is of bronze, made up of several strands, with each wrapped with a special cotton fabric. The platform spring suspension used in the electric machine in the rear is characteristic of the Woods' careful workmanship. The side spring part is of C design, with the top portion three-quarters the length of the bottom half. The top half is extended to the front beyond the center to get a leverage for taking the strain off the clips holding it to the frame bracket, it having been found that without this extension twisting resulted. It will be noted further that the cross piece of the platform is to the front and that the shackle connecting it with the side part does not admit of the side piece lengthening, but gives free lengthening to the cross part, this construction taking all twisting strains off the back axle. The cross spring is not bolted direct to a frame cross piece but is attached through an expanded V-shaped piece that is clipped to its center and has its arms attached to the frame side pieces.

MITCHELL CYLINDER DESIGN

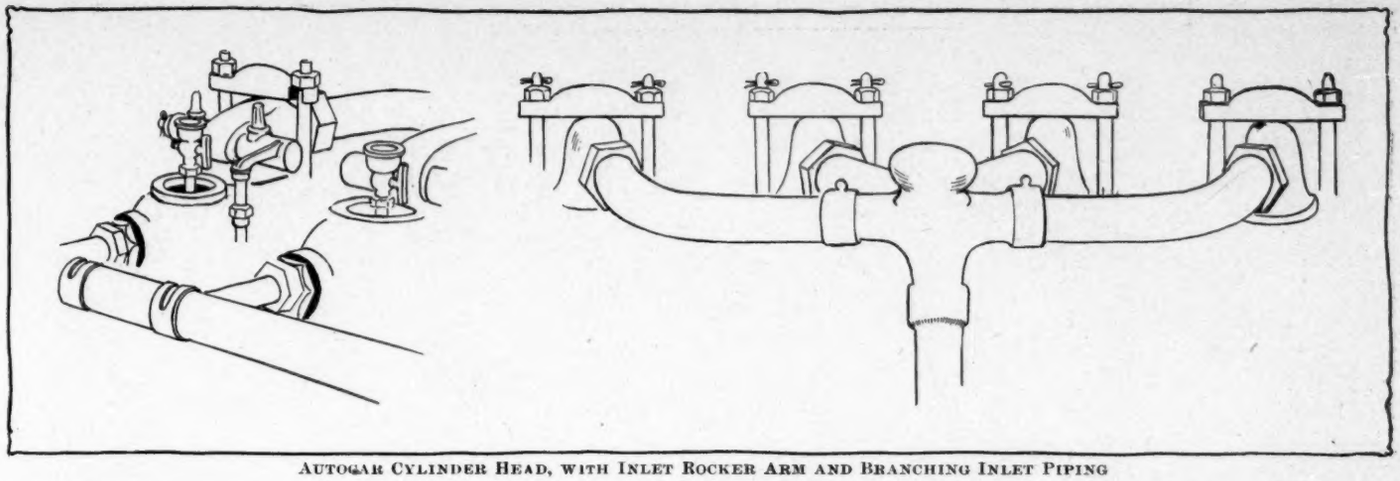
An entirely new cylinder design is used by the Mitchell people in its new four-cylinder runabout. The cylinders are separate castings with ports on the left side for the intake valves, which are opened by direct lift from a camshaft within the crankcase. On the cylinder head is a raised cylindrical part containing the exhaust valve, which is 1 11/16 inches in diameter, and which is opened by a rocker arm carried angularly over the cylinder head, so that the pushrod is operated from the same camshaft which cares for the inlets. The exhaust valve cage has a ground fit in the raised part of the cylinder head and is secured therein by a pair of vertical bolts. The rocker arm, made from bronze, is pivoted on a yoked support inserted in an expansion on the cylinder head and held therein by a short wire, which is quickly removable, so that in removing the valve the support and the rocker arm can be removed without detaching the arm. The end of the valve stem and the end of the rocker arm form a ball and socket type of contact, with the socket part in the rocker arm in the form of a removable bushing piece held in place by a rivet piece through the arm. Spark plugs are carried vertically above the intake valves and the cooling water enters the jackets through an angular piping on the right side. On this car, as well as on its other models, is used the long throttle and spark finger levers on the steering column. These levers are equal in length to the radius of the steering wheel and work on small quadrants supported on a ring piece clamped to the top of the column. The spark lever is at the left and the throttle at the right. By having the levers long little strength is required in moving them, making it possible to operate them by the second and third fingers, while the thumb and first finger remain on the wheel. Each lever is attached to a small rod passing down the outside of the steering column and having the usual connection with the commutator carried angularly at the left front of the motor and bevel-driven off the camshaft and the throttle in the carbureter at the right side.

CONTROLS ARE STATIONARY

The steering wheel in the Baker steering gear is featured by having the spark and throttle lever stationary in the center of the wheel and having the same lever serve for both. The steering column consists of three parts—an outer tubing, an inner tubing connected with the throttle, and a central rod associated



BAKER'S STEERING WHEEL — JACKSON VALVE ROCKER ARMS

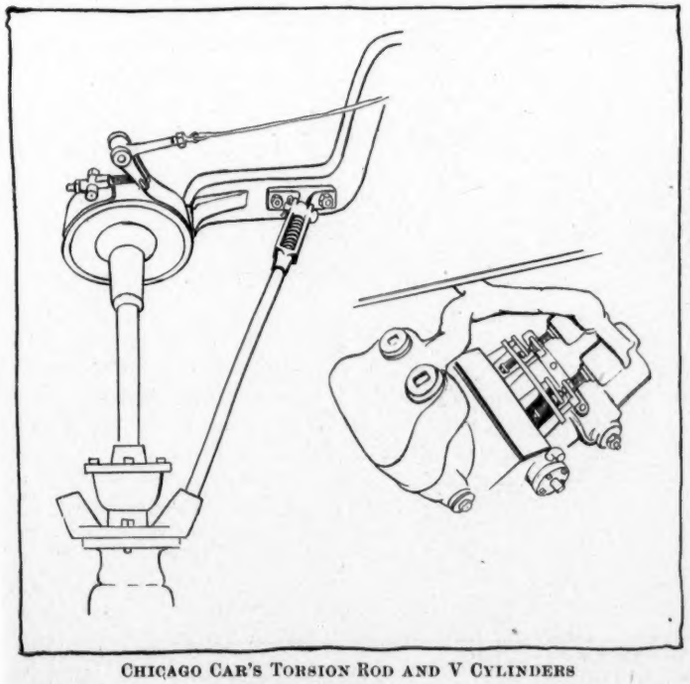


AUTOCAR CYLINDER HEAD, WITH INLET ROCKER ARM AND BRANCHING INLET PIPING

with the spark mechanisms. To the top of the central rod is pivoted the end of a short lever. Midway of the lever arm is pivoted the top of a short vertical arm which is rigidly attached with the tubing for the throttle. Raising or lowering the lever advances or retards the spark; moving it to the right or left in a toothed semi-circle opens or closes the throttle. One hand thus suffices for both, and the hand controlling the lever does not have to be taken off the rim of the steering wheel.

RAMBLER THREE-POINT SUSPENSION

Three-point suspension of the motor is one of the talking points in the new four-cylinder Rambler models. It is accomplished in a novel manner. The channel section pressed steel side pieces of the main frame do not directly carry the motor arms. A cross piece in front of the motor acts as a tie piece and further serves as a support for a pair of angular braces of channel section that have a long angular fit with the side pieces of the frame midway of the motor length. On these angular brace pieces rests a pair of motor arms. Each of these arms is integral with the top part of the crankcase and has an expanded end portion with a horizontal part resting on the top part of the channel. Three bolts secure each arm to the brace piece, two being vertical bolts held by nut and lock nut and the third a horizontal bolt passing through the vertical part of the brace piece. The third point of suspension is on a dropped cross piece at the rear, made up of two pressed steel channel sections placed back to back. The bearing part is a rear projection of the case which serves as a bearing box. Another Rambler introduction is a back kick preventive carried beneath and slightly in front of the radiator at the left, and which, while serving in this capacity, also acts as a starting crank support. A horizontal rod with hook on its forward end extends in front of the radiator, the hook with locking part serving to support the starting crank. The inner end of the rod has connection through a coil spring with the spark advance ring below the steering wheel, so that when the rod is to the front the spark can be advanced, but instantly that the starting crank is removed to crank the motor the spring pulls the rod to the rear, retarding the spark. Supposing the spring might prove ineffectual in retarding the spark the rod remains sufficiently to the front to prevent the starting crank being worked. The hook portion serves as a perfect lock, there being a stirrup part holding the hook portion in place and on the rear end of the stirrup portion is a short rod extending rearward to a flanged bracket beneath the radiator which supports it. In releasing the starting crank it is necessary only to pull out a trigger piece and pull down on the stirrup part when the crank is free to be removed.



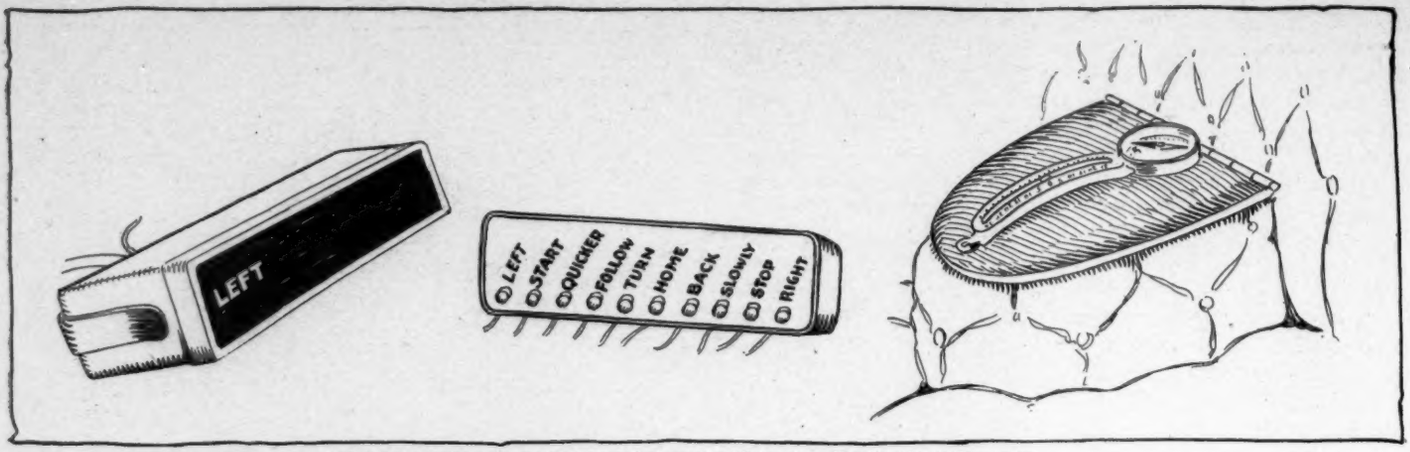
CHICAGO CAR'S TORSION ROD AND V CYLINDERS

APPERSON LIMOUSINE FEATURES

Two little details in the body work of the Apperson limousine never fail to catch the spectator's eye: One is a small tool box which serves as a divider for the front seats. The box is half-oval in shape and has the sides upholstered like the remainder of the seat. The lid is hinged at the back and on it are a gradometer and a compass, both in plain view of the driver. The other device is the annunciator, a two-part device, one part carried on the dash and the other in the side of the enclosed compartment. That on the dash is an oblong glass-covered box, beneath the glass cover of which is a set of directions corresponding with those on a keyboard in the enclosed parts of the car. Such directions as right, stop, quicker and many others are used. By pressing a key beneath the wished-for direction a small electric lamp is lighted beneath the corresponding direction in the case on the dash and the eye of the driver is attracted to it. Should the light fail to attract him a firmer pressure rings a bell, which is expected to arrest his attention. This device eliminates the speaking tube, a feature which calls for the driver's eye being taken off the road ahead and one of his hands being removed from the control of the machine. The connection between the buttons on one disk and the lights on the other is through electric wires.

CLUTCH ON A BIG TRUCK

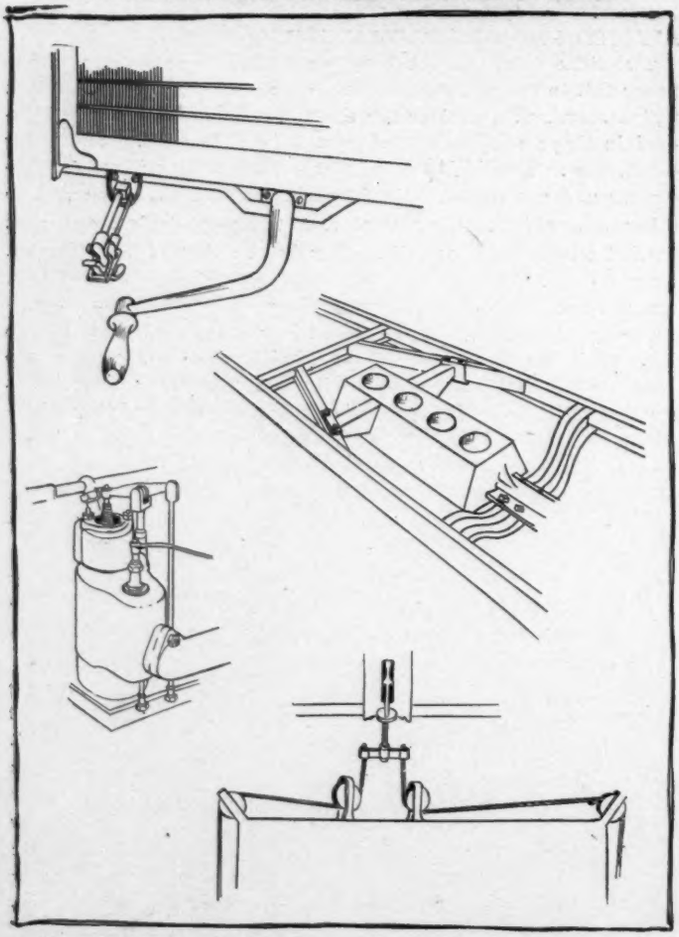
About as many new devices as crop up in any single vehicle are found on the 6-ton truck of the Kansas City Motor Co., which is exhibiting its machines for the first time this year. The truck is designed for heavy service and the many little details, bristling with individuality, have already been tested in their native state. The clutch is deserving of prominence in that it is operated by lever and has not a spring for holding it in engagement. It is neither a cone, band, nor multiple disk clutch; it is what might be designated a segmental clutch. On the rear of the flywheel is a wheel piece integral with the flywheel and of half its diameter. This part has its periphery as a V-slot,



LIMOUSINE ANNUNCIATOR—APPERSON DETAILS—FRONT SEAT DIVIDER

in which operate four V-shaped wood segments, the wood portions being supported on metal straps fastened to the forward ends of a set of rocker arms, one arm for each segment. These arms are fulcrumed on a star wheel supported on the clutch shaft. The rear ends of the rocker arms are pivoted to short arms that are again pivoted to a sliding ring on the clutch shaft. Carrying this ring to the front raises the rear end of the rocker arms, lowers their front ends and engages the wood segments in the V-slot. The sliding ring is moved by a pair of depending arms from a cross shaft, the end of the cross shaft connecting with the clutch lever. The apparent advantage of the clutch is the positive contact of the wood segments and the ease with which they may be replaced and the engaging of the clutch by lever gives a wide scope for varying its friction. In the same truck the jackshaft, carried on roller bearings at either end, is dropped considerably below the side frame pieces of the truck.

RAMBLER ANTI-KICK AND THREE-POINT MOTOR SUPPORT



MITCHELL CYLINDER HEAD WOOD'S BRAKE EQUALIZER

In doing this recourse is had to a dropped framepiece, which is riveted beneath the side frame members. The bearing boxes rest on a low pedestal in the base of this. To lend rigidity an inverted pedestal portion is made integral with the top of the bearing box, extending to the under side of the main frame, thereby acting as a brace for holding the bearing in position. This piece being held to the frame by three bolts serves also as a supporting medium. Following a principle that rules throughout in this machine, a separate compression cup oiler is used over each jackshaft bearing. The third attractive construction in the truck is the securing of the semi-elliptic springs to the frame pieces. Instead of shackling the spring ends to the frame they are secured through shackles to a metal piece which lies underneath the frame and is secured thereto by three stirrup clips, one in the center and the remaining two at the ends. This piece has curved ends similar to spring hangers. The construction obviates any boring of the frame pieces and, in reality, increases the frame strength at these places. In the same illustration the method of attaching the radius rods is indicated, there being a pair of lugs on the forward side of the axle, to which the ends of the rods are pivoted. Turnbuckle action is used in making adjustments.

CHAUFFEUR'S DISAPPEARING SEAT

Among the many attractive runabout body designs is that used on the 22-24-horsepower Pope runabout, which has in addition to its regular seat a disappearing chauffeur's seat in the rear. When the seat is not in use it folds away into the rear compartment, leaving practically no indication of its presence. To open, a handle piece on the compartment's cover is required. This cover carries the seat on its under surface. Being hinged at the back, it lies on the rear part of the compartment when opened, with the seat upright, as shown. The seat back is hinged, folding when not in use. On the back of the regular seats is a pair of hand grips and on the side of the disappearing seat are two others. The compartment in the rear of this seat part has a second swinging cover which, when lifted, discloses a large carrying compartment.

VERTICAL LEVER OPERATES CLUTCHES

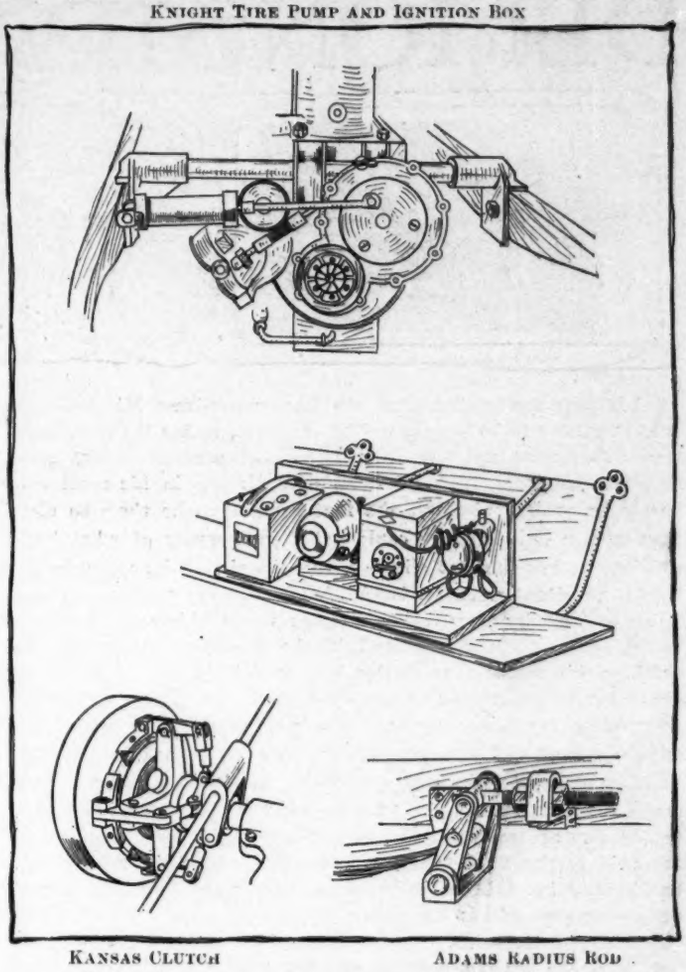
Because it makes use of a two-clutch sliding gear transmission, the Adams company, exponent of the revolving three and five-cylinder motors, is called upon to use a vertical lever, placed in the center of the footboard for operating the clutches. The lever has three movements—forward for engaging one clutch, backward for the other, and to the right for applying a brake on the transmission shaft. The shifting of the gears, which works on the selective system, is done from the steering column. Beneath the column are two levers, one on the right of the column and the other on the left, one giving the second and fourth speeds and the other for the first, third and reverse speeds. These levers are mounted on separate rods rising from the footboard and carried almost parallel with the steering col-

umn. The tilting steering column is shown. The column rises through a cross slot in the footboard, which is long enough to let the column be tilted to the left so the occupant of the left seat can control the car. When in its upright position the column is locked by a hinged piece which keeps the column in the right end of the slot. The radius rod attachment in connection with the front ends of the back springs on these machines is original. The springs are pivoted to a center bolt in a swinging shackle piece. The shackle is carried at its lower end on a cross bolt in a bracket on the frame and to the top of this bracket is attached a horizontal rod with a long threaded part. This threaded portion passes through a slotted bracket on the main frame and has a lock nut at either side of the bracket. Loosening or tightening these nuts shortens or lengthens the relation of the frame pieces to the back axle.

HOUSING OF IGNITION PARTS

The valveless Silent Knight car, a Chicago product, in addition to its novel cylinder design, has several other innovations in its makeup. Noteworthy in this line is the method of housing most of the ignition parts in a large box on the right running board. This box has the cover part composed of the top and front and which have a tight fit with the remaining parts. In this box are four essentials of the ignition outfit. At the rear is a Duro sparking battery; to the front of it is an Apple dynamo, driven by friction pulley off the face of the flywheel, a universally jointed shaft coupling the pulley with the dynamo; in front of this is a regulation four-vibrator coil, and in the front of the box is the commutator, driven by bevel gear and jointed shaft off the rear end of the eccentric shaft on the left side of the motor, the eccentric shaft serving in a similar capacity in this motor as the camshaft does in the standard type of four-cycle machines. From the commutator four wires lead direct to the plugs, being supported over the motor by a patented bridgework. Spark plugs are carried vertically in the center of the cylinder heads and above each is a knife switch for cutting any plugs out for testing purposes. Another feature in the running gear of this car is the construction of the semi-elliptical springs, which are designed as shock absorbers. To attain this object four short leaves are used on the top of the spring. The longest of these leaves is held to the center leaf of the spring by clips at either end and the remaining leaves have short studs working in slots in the leaf beneath. These springs counteract the quick rebound consequent upon dropping into a rut or other depression the same as the under leaves prevent a sudden jar when dropping into any such hole. The action of the short top leaves is the more apparent, because the entire spring is made with little bow, being practically straight when under load. The design has been tested out through the past fall with very favorable results, according to the claim of the designer. To mention one more feature of this car, attention is called to the tire pump, carried on the front of the motor and operated from the large wheel on the front of the eccentric shaft. The pump barrel is cylindrical, like those used on all other plunger pumps, and is pivoted at its outer end to the left side piece of the frame. The end of the piston rod is hooked and has a countersunk fit with a stud on the center plate of the gear housing, which, by the way, is held by three screws to the eccentric gear and revolves with it, at the same time serving as a part of the gear housing. When the pump is not needed the plunger is taken off the stud on this case and is hooked over another stud on the stationary portion of the casing, a thumb nut holding it positively on this. To inflate a tire it is first necessary to place the piston rod, as shown, then couple a hose to the valve pipe at the foot of the cylinder and start the motor. Any desired pressure can be obtained. This illustration also shows the method of carrying the motor direct on the frame side pieces. A piece of seamless tubing passes through eyeholes in projections on the end of the crankcase and is supported in brackets on each frame piece. The motor is then pinned to the tubing to prevent side slipping.

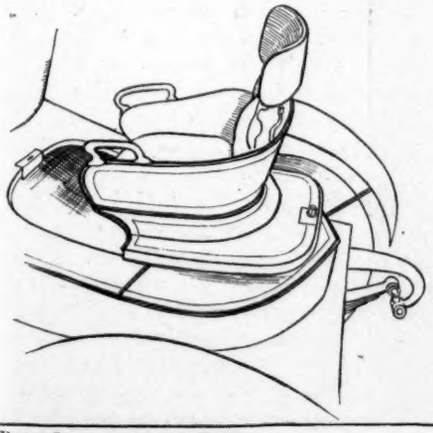
KNIGHT TIRE PUMP AND IGNITION BOX



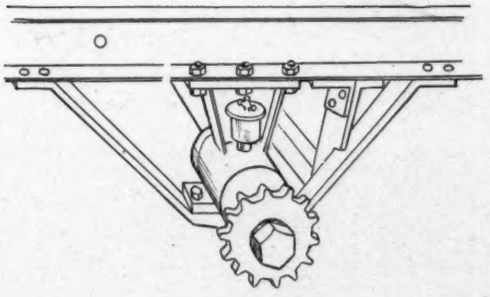
KANSAS CLUTCH

ADAMS RADIUS ROD

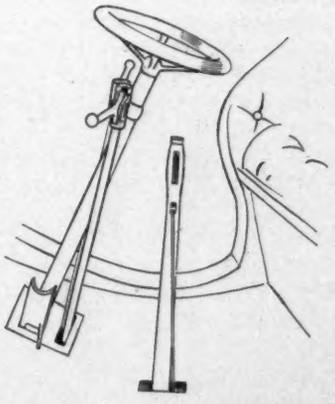
POPE DISAPPEARING SEAT



KANSAS CITY JACKSHAFT BEARING



ADAMS SPEED CONTROL PARTS

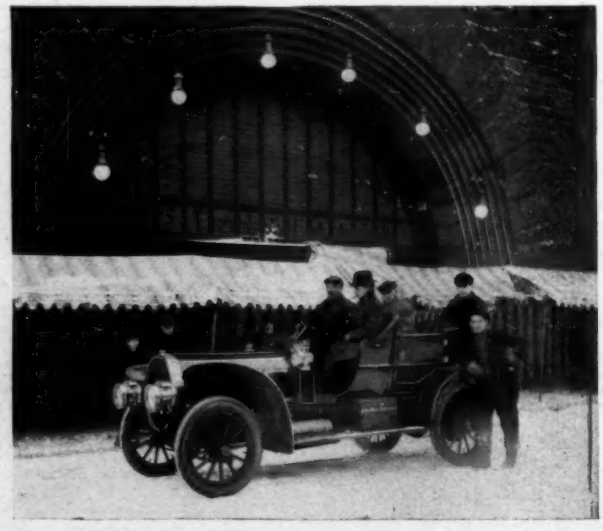


DEMONSTRATING AN ART

ALL prospective customers are like native-born Missourians—they have to be shown, which, of course, makes the demonstration department not the least important part of a big automobile exhibition. The salesman may elocute in his most convincing manner, point out the features and make them so clear that even a Fiji Islander could get a glimmering of what he is driving at, but the last clincher, the one that brings the dollars out of reluctant pockets, is the demonstration, the trump card. That is mightier even than Webster's unabridged, for actions speak louder than words, and if the salesman can prove the truth of his words that settles it—the sale is his. That's why every car manufacturer at the show has massed his heavy artillery out in front in a position where a broadside of road worth can be poured out popping like the exhaust from the big eight-cylinder motor on Hemery's Darracq, dashing over the Florida sands with the muffler off. That's why, too, that the most careful drivers are selected, the smoothest running cars picked out, for this is the final test—it determines whether the salesman has hooked his fish or he has wriggled off the hook and sought deeper waters. It is no light task, either, this demonstrating. Of course, it is possible to take two or three inexperienced ones out in a car with a flourish of trumpets, a grand stand play when the cop isn't looking, and talk mysteriously of horsepower, carbureters, the pros and cons of the ignition system and all those puzzlers which make the greenies wonder what a smart man the demonstrator is, but to go out with people who know something of automobiles, who have learned by experience of the whys and wherefores of the construction of automobiles, and make the sale—that's where the clever demonstrating comes in. The knowing ones are not taken in by the trick played by a New York demonstrator, who made a flash when he came to a steep hill up which two or three cars were trying to climb on their low gears. "Pooh," says the easterner, "That's nothing. Why, I can back up that hill," and wheeling around he threw in his reverse and went up—no trick at all when one stops and thinks the reverse is in reality a low gear in itself, and the easterner was doing nothing wonderful after all. Demonstrating that way never pays, for sooner or later the green one becomes the sophisticated motorist, and he then realizes he has been taken in and the consciousness of this often loses good trade. It is this art of handling a car so that all its fine points are brought out without resorting to deception that makes the expert worth his weight in platinum.

No one who has seen the skillful manner in which the demonstrating brigade works at the present show doubts that the best talent obtainable has been brought to Chicago. So far no accidents have been reported, although there has been several instances of arrests made for violations of the speed laws, the infractions being largely caused through ignorance of the regulations of the police department. On Saturday the demonstrating end of the game was a farce, and those direct from New York began to make comparisons and tell how they did things up brown in Gotham, how Chicago was really behind the times and all that. They had grounds for these remarks on Saturday, but what a difference there was on Monday! The break in the show allowed the reinforcements to arrive and the second day of the show found the army strongly entrenched in its position. The early birds had figured that for once the weather man would treat them kindly, especially as the ground was bare on Saturday. There was a whirling, swirling dust storm prevailing, though, but this was infinitely better than ploughing through snow hub deep. It looked for the first time in the history of the Chicago shows that there was to be decent weather in which demonstrating could be conducted.

By Monday the demonstrating cars that had been delayed in transit began to arrive and by Monday afternoon nearly every car manufacturer exhibiting had rigs ready for use outdoors. It had been expected that Michigan avenue would prove a grand sight when all these machines got to working, while many had counted on enjoying that searchlight Sam Miles had talked of—the one that was to be turned on the avenue at night so that demonstration could be carried on without the danger of accidents. It had been ordered, too, that all these rigs confine their operations to the boulevards, leaving the Wabash avenue side free for the use of those who came to the show in their own machines. MOTOR AGE'S representative was one of those who had counted upon finding the demonstrating army located on the boulevard, but one would hardly know an automobile show was on, to judge by the looks of the street. Maybe half a dozen machines lined the two curbs and there was not much doing. It looked as if there had been more delay and that New York would skin Chicago a city block so far as this end of the game went. But the MOTOR AGE man happened to wander over on Wabash avenue and then he discovered the secret. Michigan avenue had been excavated and the old familiar stamping grounds on Wabash avenue sought. Most of the car people were in the Coliseum and it was deemed too much of a hardship to ask prospective customers to drill through that long tunnel into the armory, and then out to Michigan avenue, so Major General Miles' orders were disregarded and Wabash avenue pre-empted. No one said them nay, either, so there they are, lined up for a block, with standing room at a premium. The Miles innovation proved anything but a bit, and it would take more than a bunch of blue cops to drive the demonstrating rigs back to the boulevard and away from the old stamping ground.



NATIONAL SIX-CYLINDER CAR DEMONSTRATING

The Cars Shown Exclusively in Chicago

PIERCE ENGINE CO., Pierce-Racine—Graduating from motor cars with one and two vertical cylinders to those with two and four vertical water-cooled cylinders is the nut-shell story of this Wisconsin concern. The smaller car, with two cylinders cast together, has a rating of 14 horsepower. In the larger machine the four-cylinder motor has the cylinders cast in pairs, with each cylinder an integral casting carrying its inlet valves in ports on the right and the exhausts in ports on the left. The bore and stroke are 4¼ and 5 inches and the rating is 28 horsepower. Both half-time gears for actuating the camshafts are enclosed in the front end of the crankcase. Valves, inlets and exhausts are made 2 inches in diameter, being interchangeable. The crankshaft, 1¾ inch in diameter, runs on three bearings. Of the other moving parts within the motor the pistons carry four compression rings, connecting rods are steel in I-section and the wrist pins are held to the pistons by two setscrews and nuts. In lubricating the motor a six-feed Hill oiler furnishes two feeds to the end crankshaft bearings and a feed connects with each piston. The grinding process has been made general. Pistons are ground, so are the cylinder bores, and the crankshaft has all of its bearing surfaces ground. In cooling the cylinders three active agents are employed—a flat vertical-tube Mayo radiator forming the front of the bonnet, a gear-driven water pump and a rotary fan. Each cylinder pair has the head of the waterjacket in the form of a large plate from which the water pipes to the radiator exit. Mixture to the cylinders is furnished by a Pierce carbureter designed along the lines of a separate float chamber and with mixture regulated by a revolving barrel throttle controlled from the steering column. An auxiliary air inlet is not fitted. Ignition is by jump spark. The current comes from double sets of dry cells carried on the front end of the inlet camshaft, the water pump Duplex coil on the dash. It is distributed by a Leavitt ball timer carried on the running board and pass through a four-vibrator being similarly located on the exhaust camshaft. Spark and throttle control are both on the column beneath the hand wheel, but in the smaller car only one finger lever for the two is provided, the spark being advanced or retarded according as the throttle is opened or closed. Transmission is through a four-speed planetary gearset, three speeds ahead and a reverse, and from this gearset by universal propeller shaft to the rear axle. In the gearset gears with six pitch and 1¼-inch face are employed. Drive on the third speed is direct. For the remaining speeds friction bands around the case are employed, bands for the slow speed and reverse being operated by pedal and a lever doing similar service for the second speed as well as for direct drive. The propeller shaft has one sliding universal joint at the front end. The drive shafts in the rear axle are 1½ inches in diameter and assist in carrying the weight of the car. Frame pieces of channel section pressed steel take their support through a complete set of semi-elliptic springs, those in front having a length of 42 inches and those in the rear measuring 48 inches. The rear pair is swung outside of the frame pieces. The front axle is a centrally dropped tubing with an outer diameter of 2¼ inches and having a wall thickness of 5-16 inch. One brake on the transmission is pedal-applied and within the rear hubs are metal-to-metal internal expanding brakes that are expanded by side lever. Steering is through a screw and nut gear of Pierce design. In the smaller car the motor is one of the cylinder pairs used in the large machine and the transmission is identical, but the method of drive from the transmission to the back axle is slightly different. The shaft from the gearset is continued but half way to the back axle, where a bevel on it meshes with another on a short jackshaft and from this shaft a single chain transmits to the axle. The planetary gearset, the short propeller shaft and the jackshaft are all enclosed within one casing, giving a rigid support and serving as a dust protector. In this car an angle steel frame is used and a set of elliptic springs replace the semi-elliptics in its larger brother. In both models instead of using rollers on the bottom of the push rods, the ends of the rods are of a square section well rounded, giving a wheel-like surface for the cams to bear upon. The cams on the camshaft are pinned and keyed in position and by removing the case on the half-time gears the entire shaft can be drawn out through the opening containing the front bushing,

Apperson Bros. Automobile Co.—Apperson

The latest of the many specially built automobiles being exhibited by this concern is its 90-95-horsepower runabout equipped with a four-cycle motor, having a 6¼-inch bore and 5½-inch stroke, these measurements being the same as those used on the Richard-Brasier car, the winner of the Bennett cup race last June. This runabout, a very racy-looking construction, apart from its larger motor, follows the same general designs as the 50-horsepower touring car, the motor parts, of course, being stronger. Crankshaft bearings are 1¼ inches in diameter and 3½ inches in length. The motor, with separately cast cylinders, has the valves carried in ports on opposite sides and each set opened by direct lift rods, worked through a camshaft carried on the outside of the crankcase, running in four enclosed compartments, in which the bearings and cams are housed. Two entirely separate systems of ignition are installed. In the valve caps, above the inlets are spark plugs, which receive their current from a high tension Remy magneto with combined distributor. Similarly located over the exhaust valves

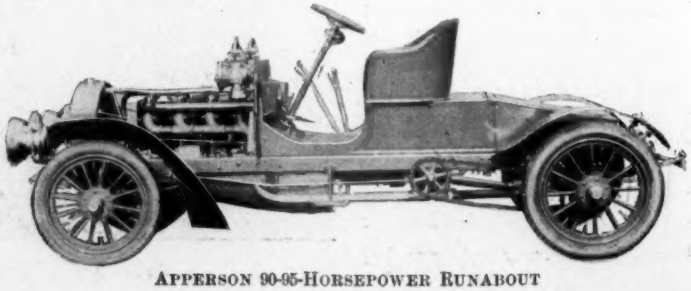
APPERSON LINE IN THE PUBLIC EYE

BROUGHAM VICTORIA WOODS ELECTRICS STANHOPE LANDAULET

is a second set of spark plugs which take their current from a storage cell through a coil on the dash and a timer, also carried on the dash, which is in view of the operator. These may be used at the same time or separately. A dashboard switch gives whichever is required. The carbureter, fashioned along Krebs lines, is carried close to the motor on the right. Exhaust pipes are made in sections, one for each cylinder. Coupling these are sliding sleeves with right and left unions, the sliding part being for the taking up of space caused by expansion of the pipes. Drive to the rear wheels is through a band clutch on a flange on a large steel flywheel, thence to a sliding gear transmission and side chains. The wheelbase of the machine is 120 inches. The pressed steel framework is supported by side truss rods and control is standard, with throttle and spark on the steering wheel and a third finger lever on a column beneath the wheel is for adjusting the needle valve and carbureter.

Merkel Motor Co.—Merkel

The 20-22-horsepower Merkel light touring car and model N, a 35-horsepower machine, arrived in place Tuesday evening and while making their debut at a national show are old timers from every point of design, being full fledged touring cars from headlight to taillight. The light car, known as model P, has a four-cylinder vertical water-cooled motor, with the cylinders cast in pairs and having measurements of 4-inch bore and 4½-inch stroke. A subframe is used for supporting the motor and gearbox and the main frame side pieces, slightly offset alongside of the motor, have a central depth of 4½ inches. The wheelbase measures 98 inches, 32 by 4-inch tires are fitted. Forty-two-inch half elliptic springs are used in front and rear. The front axle is a tubular piece carrying the Lemoine type of steering knuckles. The back axle, of the live type, has 1⅝-inch drive shafts that aid the axle casing in carrying the car and its load. The body, of the side entrance type, has a hollow dash, individual front seats, tonneau accommodation for three, running side boards and all the makings of high powered machines. In looking over the motor it is noticed that the cylinder pairs are integral castings with the interchangeable mechanical inlet and exhaust valves in ports on the left, with one camshaft opening both sets. Valves are 1½ inches in diameter and have cast iron heads, with stems threaded, riveted and brazed in position. The crankshaft, a three-bearings hammered forging, has a diameter of 1⅝ inches, with the front and middle bearings of Cramps white brass 3 inches in length. The rear bearing, 1¾ inches in diameter, is 3½ inches long. Connecting rods are drop forgings; wrist pins are hollow and are secured to the connecting rods, thus taking bearings in the pistons which carry four compression rings. The cylinder bores and piston rings and bearings are ground. A Hill oiler, ratchet-driven from the front end of the camshaft, delivers two flows of lubricant to the crankcase. A carbureter of Merkel design is used. It follows the design common with separate float chambers and has a spring controlled auxiliary air valve and a sliding plate throttle. Ignition is by jump spark, with current from storage or dry cells, the current passing through a coil on the dash and thence through commutator to the plugs carried in the caps over the valves. Control rests with a worm and segment steering gear, with throttle and spark control on the hand wheel. A regular brake applies on the transmission shaft and emergencies act on drums on the rear hubs. The big car's motor has many points of difference compared with the light car. The cylinders, cast separately, have a bore and stroke of 4⅝ and 5 inches, respectively, with the mechanical valves in the cylinder heads, the exhausts at one side and the inlets at the other.



APPERSON 90-95-HORSEPOWER RUNABOUT

INTERESTING FRAYER-MILLER CORNER IN ARMORY

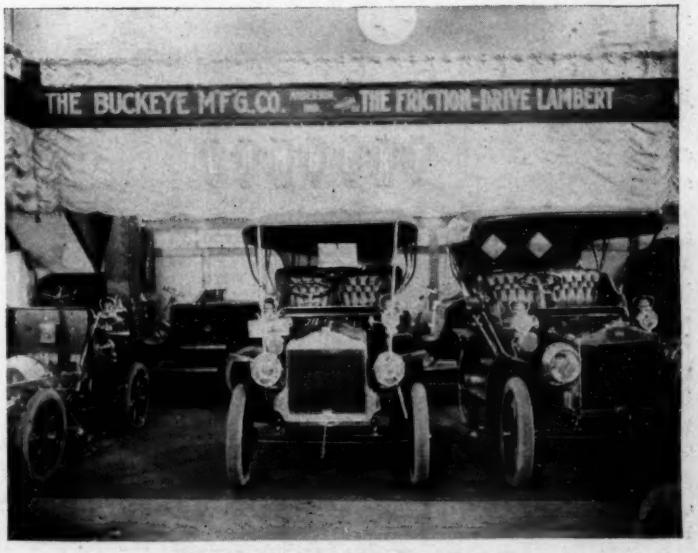
Both sets of valves are placed with the stems located at 24 degrees to the vertical. One camshaft serves to open both sets of valves. Pivoted on a support above the center of the cylinder is an inverted V yoke, with one arm resting on the top of the inlet valve and the other riding on the exhaust valve stem. A pushrod with rocker arm serves to open one set on the rise and the other on the down stroke, the system being termed by the maker the unity device. Two sparate ignition systems are used. On one a Lacoste high tension magneto with self contained coil and distributer delivers the current to one set of spark plugs, and in the other system a storage cells sends its current through a dash coil and commutator to another set of spark plugs. The two systems can be used in unison or separately. Two sets of brakes are carried at the rear hubs, one set internal expanding and the other of the contraction type. In addition to several other changes this model is made large and stronger throughout, having a floating rear axle. In both cars the transmission design includes an internal leather-faced cone clutch working within the flywheel, a three-speed and reverse sliding gear transmission running on ball bearings and a double jointed propeller shaft.

Kansas City Motor Car Co.—Pleasure Cars

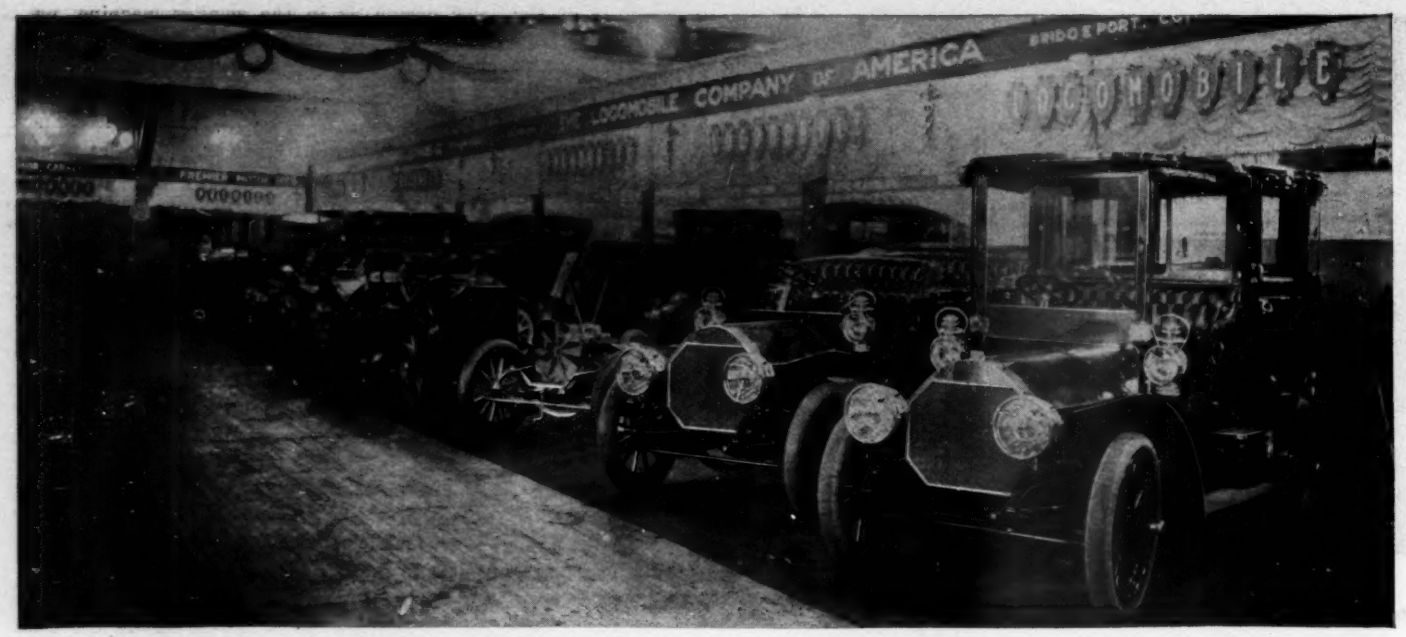
Both of the pleasure cars shown by this concern are of the opposed two-cylinder type with changes in speed made through planetary gearsets and drive through chains. The smaller machine, a 25-horsepower four-passenger light touring car, has a motor with 5¼ by 5-inch cylinders carried lengthwise beneath the center of the framework and to the right side. The cylinders are water-cooled and have automatic inlet valves and mechanical exhausts, the opening of the exhaust being by the accepted style of camshaft and pushrods. A peculiarity is noted in that the motor is carried on a pair of dropped pieces that parallel the cylinders' bore and these are carried on frame cross pieces. The motor flywheel is at the inner side of the crankcase and on a continuation of the crankshaft is the planetary gearset with a sprocket for single chain drive between the gearset and flywheel. The gearset affords two forward speeds and reverse, those ahead being gained by a side lever and the reverse brought into action by a pedal. Mixture is supplied by a Schebler carbureter and the muffler is carried under the front part of the chassis instead of at the rear. Drive is by single chain. Hyatt roller bearings are in use on the front wheels and in the rear axle parts. The wheelbase measures 96 inches, 30 by 4-inch tires are used and steering is through a worm and nut gear, these being carried in a casing at the top of the steering column. The body is of side entrance lines, with a Stolp radiator forming the front of the false bonnet. The larger car, with a 35-horsepower rating, has a pair of opposed cylinders with bore and stroke measuring 5½ and 5 inches, respectively. The power plant, that is, the motor and gearset, is of the same design as in the smaller machine, but the drive is from the gearset by single chain to a jackshaft carried close to the rear axle, thence by two side chains. Standard roller bearings are used throughout in the running gear. The wheelbase is 103 inches, 32 by 4½-inch tires are fitted and a slight difference, compared with the light car, is in that semi-elliptic springs are used in front and rear, whereas full ellipticts are used in the smaller machine. Angle iron frame parts are used in both cars.

Woods Motor Vehicle Co.—Woods

The gasoline car brought out by this prominent maker of electric machines last year will be continued during the coming season and manufactured in much larger numbers than in the past. Like all other gasoline machines, this one has been improved upon in many details, noteworthy among which are the general adoption of Hess-Bright ball bearings, except in the motor; the introduction of a readily adjustable cone clutch; doubling the brake efficiency; and adding 12 inches to the wheelbase, making that measurement 120 inches. The Woods car has as its power plant a 40-horsepower motor with 5 by 5-inch separately cast water-cooled cylinders. Mechanical inlet and exhaust valves, made of nickel alloy with heads 1½ inches in diameter and both sets interchangeable, are carried in ports on the left side. One camshaft, carried within the crankcase and with its cams pinned in position and hardened and ground, opens both sets of valves. The shaft is carried on eccentric bushings. In order to remove the entire shaft with its cams, it is only necessary to give it a quarter revolution and draw it out. The front bearing is fitted as a locking medium for the shaft when in position. The crankshaft runs on five bronze and white metal bearings and is a steel drop forging. The water pump is now placed integrally with the motor support. Each cylinder carries five eccentric ground compression rings, and is connected with the crankshaft through a chrome nickel steel I-section connecting rod fastened to the piston through an oil-tempered, hardened wrist pin secured to the piston journal. Crankpin bearings are bushed with bronze and carry oil spoons for aiding in lubricating the parts. This year's oiling process is accomplished by a six-feed Hill oiler, which delivers a feed to each cylinder and others to the end bearings of the crankshaft. A La Coste timer is located on the top of a vertical shaft at the rear of the motor. Spark plugs are conveniently placed, the coil is carried on the dash and current comes from a set of batteries or storage cells. In transferring power to the rear wheels a clutch of slightly new design serves as the first unit in the transmission. It is of the external leather-faced cone type with a series of flat springs beneath the leather to ease engagement. A telescopic adjusting feature is now attached so that by giving three nuts a part revolution each the gripping qualities can be consider-



FRICTION DRIVE LAMBERTS POSING



CHAIN-DRIVEN LOCOMOBILES IN ONE LONG LINE ALONG THE CENTER AISLE

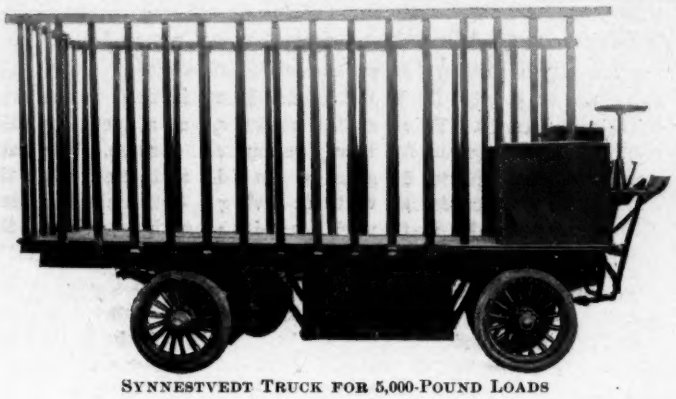
ably changed and as these nuts are accessible through the footboard the adjustment can be made while on the road, only a few minutes being required for it. Because of lengthening the wheelbase the gearbox is now placed 12 inches further back and the shaft connecting with it is correspondingly lengthened. The gearset is of conventional lines throughout, its three forward speeds and reverse coming through the use of a single lever. The differential, carried on the jackshaft, is housed in the rear part of the case. Both main and countershaft are of chrome nickel steel, a metal generally used throughout the machine. The gears of six pitch vary in width from 1 to 1¼ inches. Diamond roller chains with one and one-quarter pitch connect with the back wheels. The jackshaft sprockets have twenty-one teeth and those on the back hubs forty-five. In braking a band brake on the jackshaft and two expanding brakes within the rear hubs are used. The former is made to interlock with the clutch release in disengaging the latter when applied and further throttles the motor to prevent speeding of it when the clutch is withdrawn. The emergencies, which consist of a fiber-lined band expanding within a steel drum, also disengage the clutch when applied, but do not throttle the motor. The interlocking scheme is simple: On the crossrod carrying the clutch pedal is a short vertical arm with a horizontal rod and yoke extending to the crossrod for operating the brakes and the yoke spanning a cam piece on the brake rod. A part revolution of the brake rod brings the cam surface against the interior of the yoke, forcing the rod forward and disengaging the clutch. The short shaft carrying the yoke spanning the cam has a turnbuckle adjustment, so that should the interlocker not be required, a few turns of the turnbuckle will carry the yoke beyond the reach of the cam on the brake-shifting shaft. A main and subframe are fitted, both of channel section. The subframe is used only for carrying the motor and gearbox. The main frame side pieces are narrowed alongside of the motor. Spring suspension is through semi-elliptics, those in front 44 inches in length and 2 inches wide. The rear pair, of the same width, is 48 inches long. Axles in front and rear are of chrome nickel steel, the front with an I-cross section and carrying Lemoine steering knuckles and the rear axle, with a slightly oblong cross section, is dropped inside the rear spring seatings. Road wheels 36 inches in diameter carry 4½-inch American or imported tires. The Woods concern has, since its start in the gasoline field, used the banjo type of radius rods from the jackshaft to the rear axle. The large expanded rear end forms a dust-proof housing for the emergency brakes. A feature in the rods is a revolving bushing, where the turnbuckle for adjustment is used, so any twists are cared for by it and do not interfere with the general working of the rod. The open touring body and the limousine are of approved lines. The latter, with seating for seven in the enclosed part, has folding seats backing the front seat and two folding side seats in which the occupants back the side of the compartment and face each other. Control of the car is through spark and throttle finger levers on the steering wheel, accelerator pedal to be used in case both hands are required in steering, and the usual clutch, and brake pedals and change speed and brake levers.

Synnestvedt Machine Co.—Electric Trucks

The latest addition to the line of electric commercial machines built by this Pittsburg concern, is its 5-ton truck, a strongly-built and massive machine. The truck, of the side stake variety, takes its current from a forty-cell battery carried on dropped pieces between the car axles. The battery is made up in ten trays, four cells in each, the trays being separately removable and weighing 300 pounds each. This makes a total battery weight of 3,000 pounds. One motor supplies the power to the two rear road wheels. It is of the standard Synnestvedt type with four pole windings and is relieved of the jar and pounding occasioned by the road wheels through being carried from the framework on a cross piece through heavy coil springs. It is

SOULES DELIVERY MAKING ITS DEBUT

maintained in a fixed position with the rear axle through strut rods pivoted at the motor end and having adjustments for taking up slack in the driving chains. The motor has four forward speeds and two reverse and has practically eight windings, two for each pole. On the slow speed the windings are all in series. For second speed the two windings in each pole are in parallel and the four poles connected in series. On third speed the windings in each pole are in parallel and two poles are connected in parallel and then united in series with the other two



SYNNESTVEDT TRUCK FOR 5,000-POUND LOADS

poles, and in fourth speed the two pole windings are in parallel and the four poles are also united in parallel. The controller is carried horizontally beneath the driver's seat and is worked by a short handle at the right of the seat. Pulling a load on a level surface the motor draws 75 amperes of current and the voltage ranges from 68 to 80, the former being the minimum range for drawing loads with a medium flow of current. The chassis frame of heavy H-section supports direct the load-carrying platform. The rear axle is a solid piece of square section, 3 inches to the side, and the front axle, also a solid shaft, has a diameter of 2½ inches. Yoke type of steering knuckles working within jaw pieces are pinned to the ends of the axle. Front and rear wheels are 36 inches in diameter and carry 7-inch Firestone tires. Both the motor and the four road wheels revolve on Moffat roller bearings, those in the road wheels being of heavy design. The spring suspension is a platform combination in front and rear, the back platform being attached to the frame at the front ends of the side pieces, whereas the cross part of the front platform connects the back ends of the side frame pieces and rests against a cross part of the frame. The wheelbase is 10 feet, the weight totals 5,000 pounds, and steering is through a vertical column with hand wheel, the bottom of the column carrying a small pinion meshing with an internal toothed quadrant which has connections with the tie rod between the knuckles.

Woods Motor Vehicle Co.—Electrics

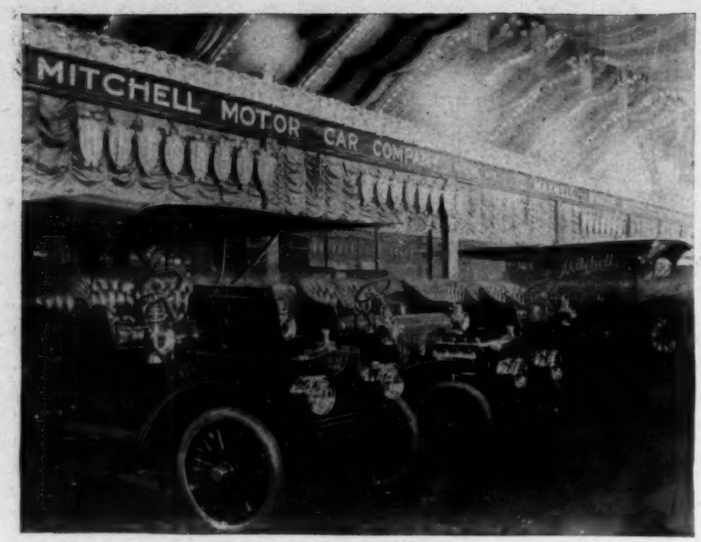
The exhibition of a polished electric chassis marks a new era in the exhibition of this class of cars. The Woods' victoria chassis discloses many pet points of this concern's manufacture. First, the method of mounting the single motor on a manganese bronze framework, which extends across beneath the car frame and is bolted thereto is new. On this framework is carried the motor on Hess-Bright ball bearings for the armature shaft, and directly beneath the motor, also carried on the bronze framework, is a countershaft driven through herringbone gears from a small piston on the armature shaft. This countershaft runs on Hess-Bright ball bearings and it will suffice to here mention that these bearings are used in all parts of all the Woods' electric machines. The countershaft has at each side of its differential double universal joints with the part of the shaft uniting them some 9 inches or a foot in length. The end parts of the shaft carrying the sprockets for the side chain drive can be moved to the front or rear through the radius rods for taking up chain adjustment, and through the medium of the two universal joints it is possible to always have the sprocket bearing parallel with the sprocket bearing on the back wheel. This, keeping both shafts parallel, is claimed by the Woods concern to be a great conserver of power, it having been proven by tests that little power is wasted through the universal joints. The motor used in this chassis, typical of Woods' motors in general, is made to give four forward speeds and four for reversing. It is designed so that the increase in torque is double that of current increase, that is, should the current drawn be doubled the torque would be four times as great. The fields have four windings. In slow speed the battery has its halves in parallel and the four field windings are in series, on second speed the battery halves are in parallel and the fields are also in parallel, on third speed the battery halves are in series and the fields in series, and in the fourth speed the battery halves are in series and the fields are parallel. The several machines shown are victoria with double chain drive and leather top, a chain-driven victoria with limousine top, a gear-driven victoria intended to be operated by chauffeur, a gear-driven surrey, a gear-driven landaulet, a gear-driven brougham and a gear-driven stanhope.

Reliance Motor Car Co.—Reliance

Last year's 24-horsepower Reliance car with an opposed motor carried beneath the body, and drive through sliding gearset and single chain, has been retained. To this has been added a two-cylinder vertical two-cycle 28-horsepower touring car, with drive through cone clutch, sliding gearset and propeller shaft. A third vehicle exhibited is a 2-ton commercial wagon with a power plant the same as that used in the two-cycle car except that a jackshaft with double side chains replaces the shaft drive of the pleasure vehicle. The two-cycle car has the vertical cylinders cast separately, each having a bore and stroke of 5⅛ and 5 inches, respectively. The operation of this motor is on what the Reliance people term a six-port system, which in its general operation resembles the three-port type, except in that each

POLISHED PACKARD CHASSIS AND COMPLETE CARS

port is doubled with a vertical bridge portion dividing them, the aim being the gaining of much larger intake and exhaust openings, without endangering piston ring action. Gases enter the crankcase through the lower left side of the cylinders and later pass through byways in the right side of the cylinder castings to the combustion chambers. The exhaust ports are on the left side and are approximately twice as large as the intakes. In order to obtain good compression in the crankcase so as to force the gases into the combustion chamber, the interior capacity of the case is reduced wherever possible, and in order to fill up as much as possible the space left, small aluminum disks are arranged on the crankshaft. The crankcase is, however, divided into two separate gas-tight compartments, one for each cylinder, and on each of the three crankshaft bearings

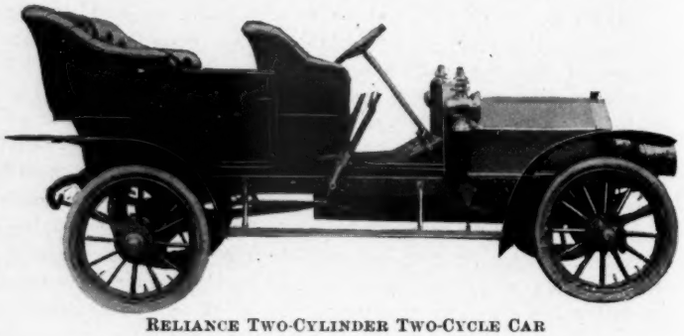


MITCHELL PLEASURE LINE WITH COMMERCIAL BROTHER

are central flanges on the shaft for aiding in holding the compression. The crankshaft is a hammered forging, 1¾ inches in diameter, with end bearings 3½ inches long each, and a central bearing within the cylinders 4 inches in length. Cylinders, pistons, rings, wrist pins and crankshaft bearings are ground. The pistons carry two bull rings on top, which are composed of one broad ring with two narrower ones carried over. Beneath the wrist pins is a single broad ring. Connecting rods are drop forgings and have bearings 3 by 1¼ inches on the wrist pins. On the front of the crankshaft is a bevel gear, meshing with which is another bevel on the bottom of the vertical shaft rising in front of the forward cylinder. Midway of the height of this shaft is the water pump, carried directly upon it, and on the top of the shaft is the commutator. The cylinders are separate castings with heads arched and cast integral. Ignition is by jump spark with the coil carried on the front of the dash and inside the bonnet, this position being necessary because the hollow metal dash contains the gasoline tank. The Reliance clutch is of the leather-faced, cone variety acting within the flywheel rim. To prevent sticking of the leather, small hickory pegs, placed radially in the metal of the male portion and projecting through the leather covering, are used. When the clutch is engaged the tops of these pegs are slightly above the face of the leather. The sliding gearset gives three forward speeds and one reverse and is carried on babbitted bearings throughout. These bearings are not oiled directly from the splash within the case. In the top half of the gearbox is a shelf-like projection

NATIONALS WITH ROUND RADIATORS AND SIX CYLINDERS

carrying a depression, in which is a piece of felt encased by a gauze covering. The oil from the splash saturates this felt and after filtering through it is conducted by oil passages to the bearings. Nickel steel is used both in the gear shafts and gears, and it is of interest to note that the webs of the stationary gears are made integral with the shafts, and to these webs is bolted a ring piece carrying the gear teeth. Final drive is by shaft to the center of a floating rear axle, the drive shafts in the axle being 1⅜-inch nickel steel. In the running gear, such features as the following are standard: Nickel steel, drop forged front axle, annular ball bearings in the four road wheels, 34 by 3½-inch tires, 110-inch wheelbase, pressed steel frame pieces with a central depth of 4⅝ inches and standard steering gear. The same power plant, clutch and transmission is used in the new 4,000-pound truck. This vehicle, however, has a specially built running gear intended for heavy commercial service. The back axle is a square piece, 2 inches to the side, and is set with the sides at 45 degrees to the vertical, giving a diamond-like effect. A drop forging of I-section with a 3-inch depth constitutes the front axle. Timken roller bearings are used throughout in the road wheels, which are, by the way, 32 inches in diameter and carry 4-inch tires. The frame pieces are of channel steel section. In the jackshaft each end bearing is 8 inches in length and is carried on Hyatt rollers. The disposition of the motor is favorable. It is carried directly beneath the seat and is accessible through swinging doors in the ends of the seat and, if necessary, the seat can be removed without taking out any bolts. A specially made round tube radiator of large size is carried below the dash. Above it is a separate water tank and on the



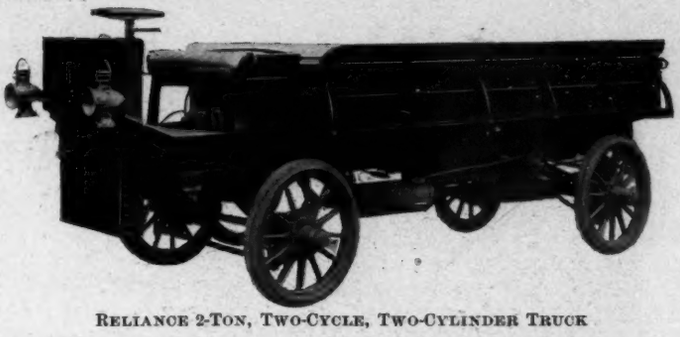
RELIANCE TWO-CYLINDER TWO-CYCLE CAR

rear of the dash is the gasoline tank. Changes in speed are through a radial lever on the vertical steering column; on the hand wheel are throttle and spark levers; in the footboard are the brake and clutch pedals, and at the right is an emergency brake lever. The car is made in three styles: express body with 11 by 5½ carrying space; a stake truck with 14 by 6 load platform, and canopy topped side wire delivery wagon with load space 11 by 5 by 5½ feet. Both internal and external brakes are used in each rear hub, but these differ from the ordinary in that a separate drum is used for each set, there being an open space of from ½ to 1 inch between the drum for the regular brakes and that for the emergencies. Should one drum of the brakes become heated, the drum for the other sets, being separate, is cool and ready for work.

Harrison Wagon Co.—Harrison

The Harrison car, a newcomer from Michigan, takes its place in the regular touring car field because of its large size and accepted lines of construction. It is a five-passenger machine with 115-inch wheelbase and 35-40-horsepower motor. The motor has separately cast water-cooled cylinders with automatic inlet and mechanical exhaust valves located in the cylinder heads, the inlets at the left side and the exhausts at the right. In opening the exhausts pushrods with overhead rocking arms are used. Instead of raising the pushrods by cams on the camshaft, face cams are used. These bear upon adjustable flanges feathered to the camshaft. Against the side of these flanges, remote from the face cams, bears one end of a swinging sector, the pushrod resting on the other end of the sector. As the camshaft

is turned, the face cams move the flanges from them, which movement is transferred to the swinging sector, which, when carried or partly rotated through the cam action, raises the pushrods. A cam adjuster is attached by which the lift of the valves may be varied. The crankcase is made of an alloy of copper and aluminum, with two inspection plates on either side, and is cast in one piece. The crankshaft of carbon steel turns on five bearings and the connecting rods, pistons, rings and wrist pins are standard throughout. The water pump has an automatic alarm for notifying the driver should any break occur. Water in the circulation passes through the intake vapor pipes. The entering vapor in the motor, being a cold gas, tends to cool the water and at the same time the warm water prevents condensation of the mixture. The carbureter of the company's own design is made with a separate float and is characterized by the absence of spring-controlled valves. Both the throttle and air intake valve are under control by steering wheel lever or accelatory pedals. At the union of the carbureter pipe with those to the four cylinders, a valve-controlled air opening is provided, which serves as a brake on the motor. When the

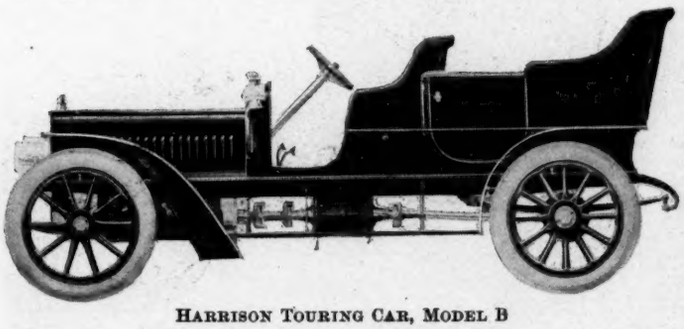


RELIANCE 2-TON, TWO-CYCLE, TWO-CYLINDER TRUCK

without retarding the commutator. The brushes of the commutator are at 180 degrees. The double brush and segment scheme is to reduce chances of a loose connection or a bad contact. The clutch of the internal expanding type has a female portion, the rim of the flywheel, and the male part has four leather-faced aluminum shoes, which are expanded through lever and expanding cone action. The transmission gives three forward speeds

POPE GASOLINE AND ELECTRIC, PLEASURE AND COMMERCIAL CARS, FORMING THE LONGEST LINE AT THE SHOW

throttle is closed this is open, admitting cold air into the combustion chambers. Motor lubrication is by Madison-Kipp oiler. Jump spark ignition is used, with spark plugs in the sides of the cylinders at the left. The commutator carried on the dash is driven by a jointed shaft, which is level with the top of the cylinders at the left and which is driven by bevel gears through an obliquely-rising shaft from the front end of one of the camshafts. In the commutator are two fiber rings with twelve segments which have stationary binding posts without movable primary wires. By using twelve segments—a double system—four are used in starting, the remaining eight coming into service after the car is started. The four segments are extra long and arranged in a group distinct from the eight, and are so arranged that whenever the motor is stopped a contact is made



HARRISON TOURING CAR, MODEL B

and reverse, changes being made on the selective system, provision being made for changing speeds without passing through gears. A feature of the gear design is that gears on the main shaft and countershaft, which are arranged in pairs and are always in mesh, sliding while in mesh and when idle are still in mesh. On direct speed all gears are idle. The connection is made by heavy lug couplings that slide with the gears. Final drive is by propeller shaft. The rear axle, of the floating type, is carried on roller bearings. Wheels are regularly 36 inches in diameter with 4-inch tires. Both internal and external brakes are used.

Chicago Pneumatic Tool Co.—Runabout

In addition to its general lines of batteries, and air and electric drills, this Chicago house is exhibiting a car made especially of its own parts. This machine, of the runabout type, is not for selling purposes, but for the exclusive use of the concern. The motor, with four separately-cast water-cooled cylinders, has a rating of 42 horsepower, the bore and stroke of the cylinder being 4 and 4½ inches, respectively. Such cylinder parts as bore, pistons and piston rings are ground. Valves are carried in ports on the left of the cylinders and are mechanically operated from a single camshaft enclosed within the cylinder case. Ignition is by jump spark with current furnished from dry cells. The timer is carried on the dash. Drive from the motor is through a regulation leather-faced cone clutch, in the rear of

TWO MODELS OF DELIVERY WAGONS
MADE BY THE SOULES COMPANY

which is the three-speed and reverse sliding gear transmission, with connection with the propeller shaft to the center of the non-floating rear axle. The wheelbase is 90 inches; the machine weighs 1,800 pounds and 30 by 3½ tires are used. A feature noted in the motor bearings is that the bottom half of the bearings are bronze, and aluminum forms the top portion. A carbureter of the company's own design has the float in a separate chamber, has a sliding piston, auxiliary air valve and the throttle is also on a piston valve. In the running gear are straight pressed steel side pieces, 4 inches deep in the center; I-section in the front axle and standard springs. Lubrication is by a four-feed pump.

Detroit Auto Vehicle Co.—Crown

The new 24-horsepower four-cylinder machine exhibited by this concern follows standard lines throughout. The cylinders are separately cast with a bore and stroke 4 by 4½ inches. Valves are placed side by side in the cylinder heads and are operated by rocking arms and pushrods, the camshaft being encased in the right side of the crankcase. In this side of the crankcase are twenty-seven inspection plates secured by thumb screws. Valve cages screw into the cylinder heads. The valves are made interchangeable. The crankcase, made standard throughout, carries the crankshaft bearings in the top half, the bottom serving only in the capacity of an oil can. The crankshaft is forged from high steel. The pistons are carefully ground. In the lower ends of the pistons are oil grooves to assist in the lubrication. Ignition is by jump spark, a commutator being carried on the top of the vertical shaft, the coil located on the dash and the dry cells carried on the running board. A float feed carbureter following on these lines is fitted and both the spark and gas are controlled by ratchet levers on the steering wheel. Drive from the motor is by a two-speed and reverse planetary gearset coupled to the rear axle with a universal propeller shaft. In the running gear of the car are such features as an angle steel frame supported by a wood armor. Semi-elliptic springs are provided in rear. The front axle is of tubular construction and the wheels are fitted with 32 by 3½-inch tires. By using the cross spring in front carried directly above the axle a three-point suspension is obtained. Steering is through a worm and sector. Radius rods are used for both the front and rear axles. A subframe is not required and the gearbox is carried in a bed piece which is supported by cross pieces of the frame. The Crown runabout, a new production of this house, is a 12-horsepower car with a pair of water-cooled, four-cycle cylinders carried crosswise beneath a bonnet in front. The motor follows typical lines throughout, having mechanical inlet and exhaust valves located in ports on the cylinder heads, a central camshaft sufficing to operate both sets. Cooling is by vertical tube radiators forming the front of the bonnet, thermo syphon cooling system being in vogue. Ignition is by jump spark with current furnished by dry cells; lubrication is by exhaust pressure from an oiler carried on top of the crankcase and control of spark and gas is from the steering wheel. Friction transmission is adopted. On high speed, direct drive is obtained without any of the transmission wheels revolving. This is possible by having the front end of the propeller shaft carrying the mail portion of a clutch operating within the flywheel. On this shaft in rear of the flywheel is a sliding friction wheel which contacts with a friction disk carried on a cross-shaft near the left frame piece. The periphery of this disk contacts with the flywheel rim and the sliding friction wheel on the propeller shaft contacts with the face of the disk. Changes in speed are made by moving the friction wheel fore and aft on the propeller shaft, it being understood, of course, that on all speeds other than direct drive, the flywheel clutch is disengaged. The running gear follows typical lines throughout and the body is a conventional runabout with semi-elliptical carrying compartment on the rear platform.

Soules Motor Car Co.—Soules

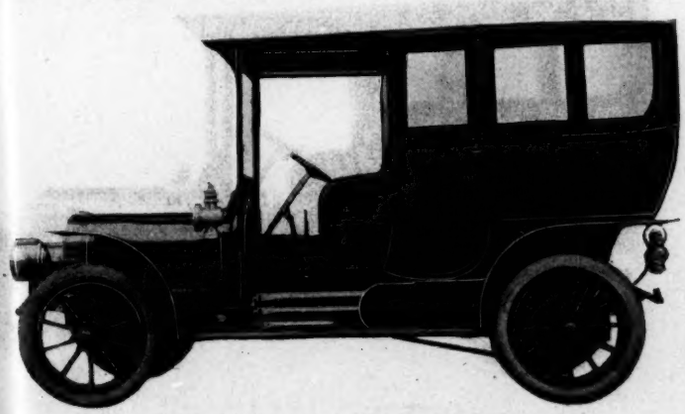
This 1,500-pound load-carrying commercial wagon made its debut during the past autumn and is offered for the coming season without any noticeable changes. The motor and gearbox are carried in a combined casing supported through a three-point suspension on the main frame. From this drive is through a shaft to the live rear axle. The motor, a pair of opposed 5½ by 5-inch water-cooled cylinders, has a rating of 22 horsepower

CROWN FOUR-CYLINDER TOURING CAR

at regular crankshaft speeds. Placing the cylinders crosswise and carrying them beneath the floor of the car and practically over the front axle gives a very accessible power plant. The gearcase, being immediately behind it, can be reached from beneath the seat, leaving the entire load-carrying platform without any machinery other than the propeller shaft beneath it. With this layout it is never necessary to remove any of the load when inspecting or repairing the motor or gearbox. The combined motor and gearbox casting resembles in its entirety the letter T with the cylinders, the arms, and the vertical part, the crankcase and gearbox. The flywheel is on the front end of the shaft and is carried close in the rear of the radiator, its spokes serving in the capacity of a fan. A cone clutch is carried in a separate compartment between the crankcase and gearbox, the front half of the clutch case being a continuation of the crankcase and the rear half of it being a part of the gearbox, so the two parts when bolted together form the union of the crankcase and gearbox, making the power plant case a unity. The motor parts are standard throughout. The crankshaft, a drop steel forging, has a total bearing length of 11⅞ inches, the bearings being white bronze metal; the flywheel, 20 inches in diameter, weighs 135 pounds; pistons carry four lap-joint compression rings, three at the outer end and one inside of the wrist pin for preventing oil working past the piston. Jump spark ignition, with spark plugs placed in recesses in the ends of the cylinders, is used, the current being taken from dry cells and carried through a coil and timer. The latter, when moved to advance or retard the spark, is so constructed that the high tension wires remain stationary at all times. To do this the commutator casing is made with two bronze segments embedded in it. Against the outside of these segments stiff springs connected with the high tension wires bear, the length of the segments being sufficient so that when the casing is rotated it remains in contact with them. The cone clutch has the male part carried on the end of the crankshaft. The shell female portion, of cast steel, has a bearing on the end of the crankshaft and also in the front of the gearbox and is solid with a sleeve entering the gearcase, and which carries the master gear of the gearset. The cone, when engaging, has an end thrust, but once engaged the thrust ceases because of a rest part on the cone. In the sliding gear transmission there are two forward speeds and one reverse, the high speed being direct to the rear axle along the mainshaft. The brakes are all on drums on the rear wheels, an internal and an external brake on each drum. The internal brakes are pedal-applied. The external bands working on drums 13 inches in diameter and 2 inches wide, are applied by side lever. Steering is through a Brown-Lipe irreversible gear with a 15-inch hand wheel. On the wheel column are spark and throttle control finger levers.

Kansas City Motor Car Co.—Commercial Cars

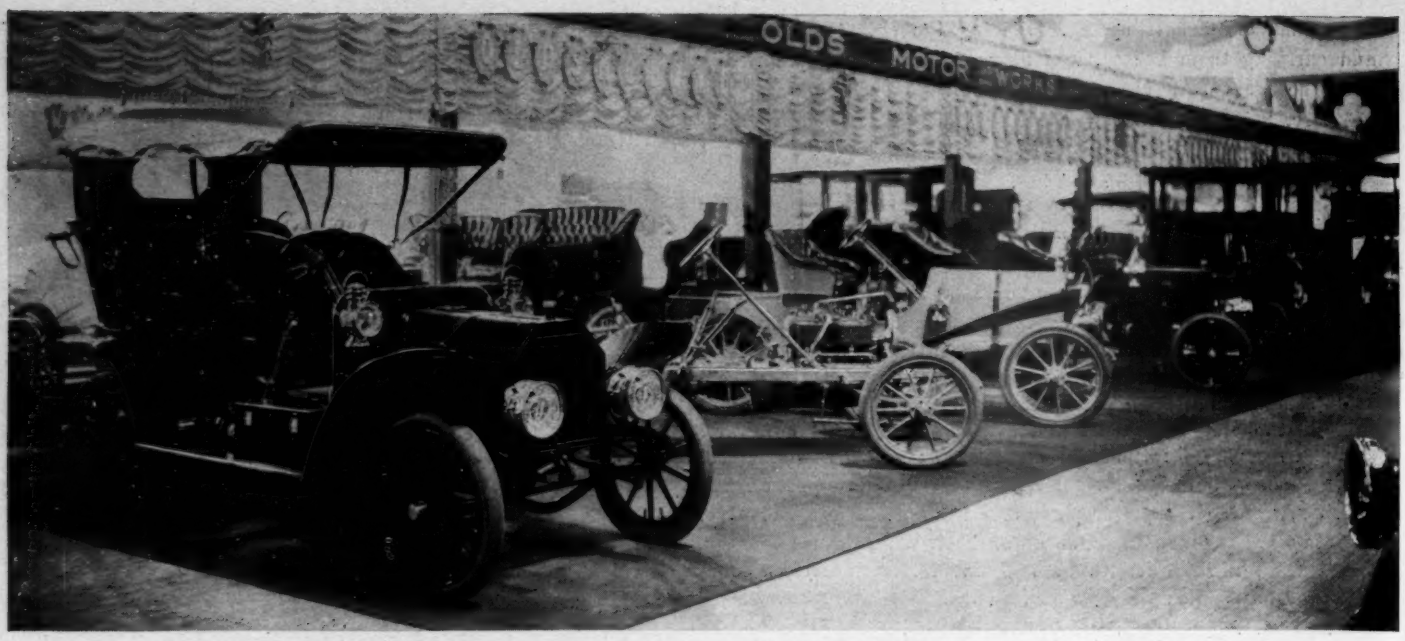
The biggest thing in the exhibit space of this western concern is the monster 60-70-horsepower commercial chassis which overshadows the two pleasure machines shown. The chassis, with a platform or stake body, is capable of handling 6-ton loads over the hilly places of Colorado, its native state, and the motor



WOODS GASOLINE LIMOUSINE CAR

KANSAS CARS ON INITIAL CHICAGO VISIT

four horizontal cylinders, placed in pairs, one pair on each side of the crankshaft, the crankshaft being lengthwise of the car, as in a four-cylinder pleasure car, is a strong proposition. Each cylinder is a separate casting with its head and waterjacket cast integral, there being a valve port on the top of the end, in which are carried the automatic inlet valve at the outer end and the mechanical exhaust at the inner. The crankcase, a massive, box-like piece, is split horizontally in line with the crankshaft bearings and has the entire top part a removable cap, which, when off, exposes the camshaft in the top of the case and the crankshaft and connecting rods. The motor is carried on two dropped cross pieces, one in front and the other in the rear. The cylinders have no other support than the bolts by which they are secured to the crankcase. Mixture from a Schebler carbureter is conducted to a point beneath the center of the crankcase and from this one pipe leads to each pair of cylinders, branching, of course, to the two inlet valves. In oiling the motor separate oil cups are carried over the two crankshaft bearings, and it is interesting to note that in the gearbox are four separate oil cups, one for each bearing. The jackshaft carries four similar oilers, on each steering knuckle is one, and the other parts of the car are similarly cared for. Ignition is by jump spark with timer on the front end of the camshaft. Spark plugs are carried in the sides of the cylinder heads, a coil is on the dash, and spark control is on a finger lever on the side of the steering column. Cooling is by a Stolp, horizontal-tube radiator forming the front of a small bonnet. This bonnet is on the front of a separate frame piece that is secured to the front end of the regular frame, this auxiliary frame part serving also as a footboard, thus increasing the length of the load carrying platform. In transmitting from the motor to the sliding gearbox a friction clutch carried on the flywheel is used. On the rear of the flywheel is a wheel piece of half the flywheel diameter with the rim a V slot. In this slot work four wood segments of V-shape under surface. By a sliding ring and set of levers, one lever to each segment, the segments are forced into the V-slot, giving a wide bearing surface, the wood segments bearing against both sides of the V-slot. The clutch is not held in engagement by a spring, but is controlled by a lever beside the seat. It is interlocked with the gearset, prohibiting the changing of gears with it engaged, and is further interconnected with the regular brake on the jackshaft applying it when disengaged. The gearcase, of the sliding pinion type, gives two forward speeds and one reverse and carries in a rear compartment the differential on the jackshaft. Changes in speed are through a side lever. The jackshaft runs on Hyatt roller bearings and Standard roller bearings are used in the road wheels. The front wheels are 36 inches and the rear wheels 40 inches in diameter. Both sets are shod with 5-inch Firestone tires. In

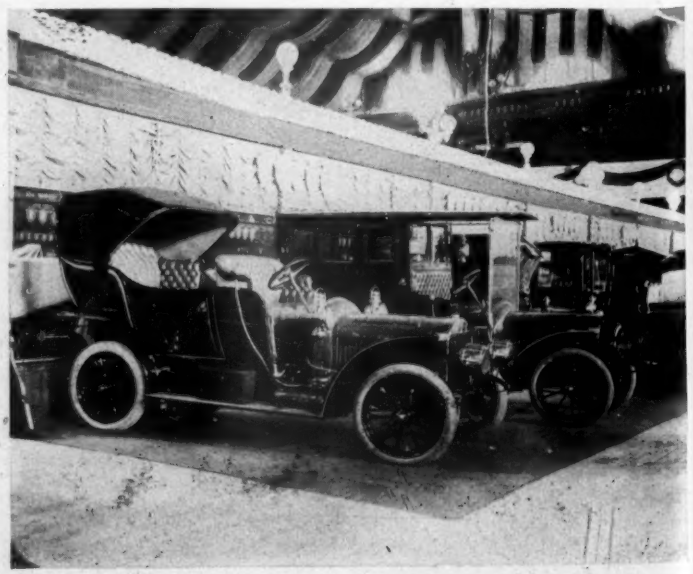


OLDS INTRODUCES FOUR-CYLINDER CAR AND TWO-CYCLE MACHINES, BESIDES RUNABOUTS AND TRUCKS

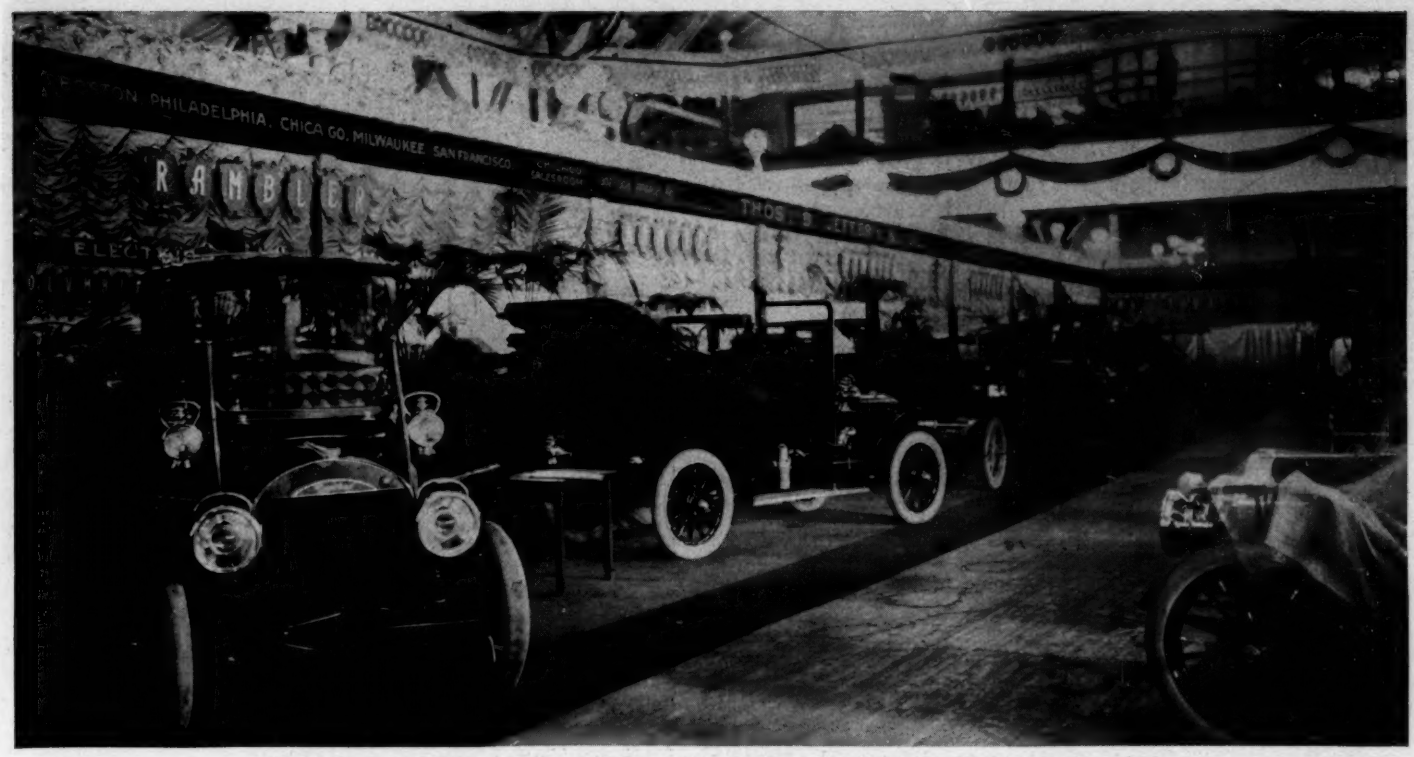
the running gear several novelties crop up. One is that the semi-elliptic springs in front and rear are not shackled direct to the frame pieces, but to curved spring hangers, which are the curved ends of a metal strap which lies against the under surface of the frame pieces and is held thereto by three or four stirrup clips. The front springs are thrown slightly inside of the side pieces. The frame pieces are of H-section. Both axles are of round cross section with square spring seatings. Steering is through a worm and nut gear. Control parts consist of a pedal for the throttle control, clutch and change speed levers and a brake pedal.

The Adams Co.—Adams-Farwell

To the three-cylinder revolving motor exhibited by this concern a year ago has been added a five-cylinder class, with the motor parts identical in operation with those in the three. Besides this, the concern has many other innovations to offer, not features that have not as yet been tested out, but constructions 2 or 3 years old, which are for the first time presented to the public. One of these is the new selective type of sliding gear transmission, giving four forward speeds and a reverse and using two friction clutches for flexible connection between the motor and gearbox. Besides this a tilting steering feature has been added, making it equally easy to steer from the right or left side of the front seat. In the body lines a new model with side entrances and forward bonnet is shown. In all Adams models the motor is carried over the rear axle, the sliding gearset is carried directly beneath the motor and final drive is by single chain to live rear axle. Hess-Bright ball bearings are used in the gearboxes and Timken rollers serve in all of the road wheels. The bodies on the four models exhibited display the lines of individuality that characterize these models throughout. One is an extension front brougham with a five-cylinder motor rated at 40-45 horsepower. The second is a straight brougham with the same motor plant and the transmission also being the same, which is a combination of planetary and sliding gear; the third model, a new comer, is more conventional in its lines, having a side entrance tonneau, with large false bonnet and long wheelbase and having a five-cylinder motor, but using the new two-clutch gearset. The last machine, a convertible runabout, has a three-cylinder motor rated at 20-25 horsepower and the combination planetary and sliding gear transmission. Readers of MOTOR AGE are familiar with the Adams revolving motor and recall how its three cylinders are as the spokes would be in a three-spoke wagon wheel. In the five-cylinder motor the design is the same. The short vertical crankshaft remains stationary while the cylinders revolve around it, acting as a flywheel and having a rotating movement which makes cooling easy by longitudinal flanges. But one throw is required on the crankshaft. It is 5 inches long and is enclosed in a long bronze bushing. On this throw are the end bearings of the five connecting rods in case of the five-cylinder machine. Naturally the bearing surface on each rod is small. The connecting rods are yoked at this end and each yoke arm has a bearing surface 5/8-inch wide. Nickel steel connecting rods are used in the five-cylinder cars and bronze in those with three cylinders. Each cylinder has a five-ring piston, which has its surface ground. The cylinders are turned and then put on a stand and run continuously for 6 or 8 days until they are worn down, leaving a clearance space of 2/1,000-inch between them and the pistons. In this wearing process a heavy supply of oil is used and the pistons receive a gloss finish. In each motor the mechanical inlet and exhaust valves are carried in the cylinder heads and are opened by rocker arms and pushrods from the crankcase. In controlling the inlet valves provision is made whereby the inlet valves can be held open for any desired part of the compression stroke. This is accomplished by a double cam action. There are two camplates side by side, one plate for opening both inlet and exhaust valves and another differential camplate for holding the inlet open. By a pedal on the

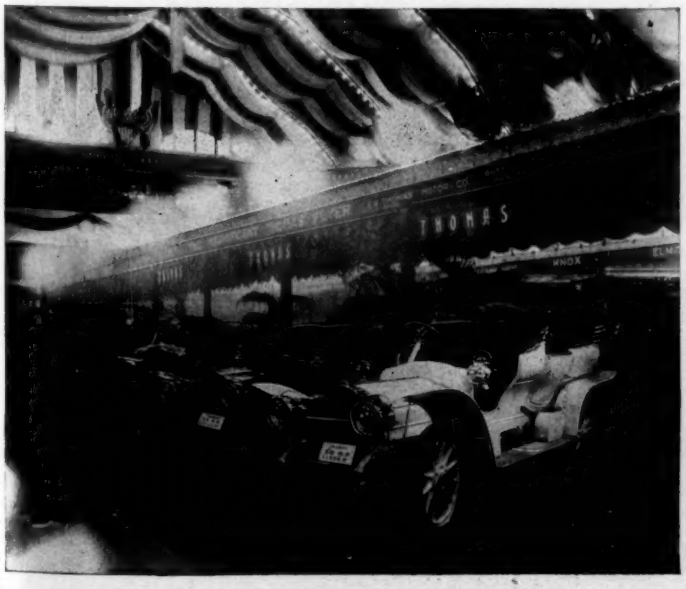


WOODS IN TOURING AND LIMOUSINE LINES



RAMBLERS—THE CARS THAT MADE KENOSHA FAMOUS—IN TWO AND FOUR-CYLINDER STYLES

footboard the driver can shift the differential cam on its axis so that the cam will continue to hold the inlet valve open after the regular cam has continued on its revolution. In this way part of the mixture is forced out of one cylinder on the compression stroke and enters another cylinder which is on its suction stroke. When the inlet valves close at the end of the suction stroke a compression of 95 pounds is used, which pressure falls proportionately when the inlet valve is held open during a part of the compression stroke. The new selective type of transmission is carried crosswise of the car frame, Pope-Toledo fashion, and has a bevel in the center of its mainshaft, which is driven from another bevel on the bottom of the revolving cylinder crankcase. This bevel has a friction clutch at either side of it in the mainshaft and on a sleeve on the shaft beyond each clutch is a pair of spur gears. On a countershaft, parallel to and behind this mainshaft, are two sets of sliding gears, one set on the right half of the shaft and the other at the left, and these sliding sets mesh with the gears on the mainshaft. One clutch is used for the second and fourth speeds and the other for the reverse and first and third speeds. The clutches are worked by a vertical lever in the center of the footboard, so as to be equally accessible to a drive in the right or left seat. Moving this clutch lever to the front engages one clutch, giving the second and fourth speeds, and drawing it back engages the clutch for the remaining speeds. The gears on the countershafts are moved by two short horizontal levers carried on the tops of rods rising alongside of the steering post, one on the right for the second and fourth speeds and that on the left for the remaining speeds. With this gearcase if the car is running on the fourth speed, through the right clutch, the reverse gears can be meshed and then by simply pulling back the clutch lever, thus throwing in the other clutch, the reverse gear becomes effective. Three brakes are used, internal expanding ones on the rear hubs and foot applied by pedal at either side of the footboard and moving the clutch lever to the right applies a transmission brake. Angle steel frames are used on all models, as are semi-elliptic springs. Wheels are regularly 34 inches in diameter and tires are 4½ inches, except on the front wheels of the convertible runabout, where 4-inch tires are used. Wood bodies are generally adopted.



THOMAS FLYERS IN DIVERS-COLORED FINISHES

Auburn Automobile Co.—Auburn

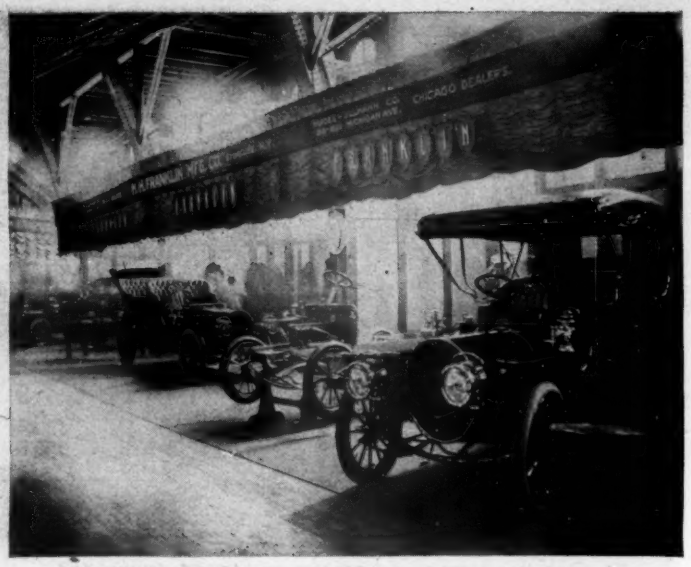
In only a few minor details do the Auburn cars of the present season differ from those in use during the past 12 months. As heretofore the opposed two-cylinder water-cooled motor carried lengthwise amidship remains, as do planetary speed change device and single chain drive. The cylinders, measuring 5 inches in the bore and stroke, produce 20 horsepower at 800 revolutions per minute. Like most other cars with this type of motor the cylinders are carried close to the left frame piece and take their support beneath a pair of angle cross pieces, to which they are secured by two bolts. The crankshaft continuation to the right acts as an axis for the planetary gearset, with the flywheel located between the motor and gearset. Beyond the gearset and at the right side of the frame is the third crankshaft bearing. The cylinders are separate castings with cut valve ports, the valves being in the cylinder heads. The cylinders are offset and bolted to a central crank chamber, on the top of which is a six-feed oiler, with a pair of feeds leading to the crankshaft bearings. Two others conduct lubricant to the cylinders, the third pair delivering its supply to the connecting rods, from which it passes to the wrist pins and crank

throws. Valve actuation for inlets and exhausts is through a camshaft in the bottom of the crankcase with pushrods along the cylinder sides and rocker arms across the heads. Each valve is located in a separate housing threaded into the cylinder heads, making it necessary in removing a valve to first disconnect the rocker arm and then unscrew the valve cage. Inlet valves are on the inside and take their mixture supply from a carbureter carried accessibly beneath the footboard. Throttle control and spark advance and retard are through finger levers on the front of the steering column beneath the hand wheel, the rods connecting from the levers to the respective parts controlled passing down to the footboard beside the steering column, one on the left and the other on the right side. Ignition is by jump spark with plugs carried vertically in the top of the cylinder above the intakes and current taken from dry cells through a coil on the dash and timer on the camshaft end. One pipe connects the exhaust valve cages with the cylindrical muffler carried crosswise at the back of the chassis. The gearset, affording two forward speeds and the looked-for reverse, is carried on the same cross pieces that support the motor through brace supports from the bottom of the friction bands on the gearset drums. On high speed drive is direct, the engagement being through a cone. Drive by a ⅝-inch roller chain from a sprocket between the flywheel and the gearset to another surrounding the differential is used. The rear axle is of the divided type, the drive shafts aiding in carrying the car's weight. All parts in it revolve on roller bearings. The friction band brakes are placed one on each side of the differential. Beneath a false bonnet are the gasoline and water tanks, the former very large and to the rear of the other. Both are strapped in position by upright bolts and metal cross straps over the tops. Forming the front of the bonnet is a horizontal-tubed radiator carrying cooling fins and connecting with the water tank at one end and through two bronze two-pinion gear pumps with separate connection to each cylinder, there being a pump for each waterjacket supply. The water tank contains 8 gallons and the radiator has a radiating length of 76 feet. The running gear possesses such features as angle frame pieces throughout, elliptic springs in rear thrown outside of the frame pieces and semi-elliptics in front, 94-inch wheelbase, 30 by 3½-inch tires, Brown-Lipe steering gear with tilting wheel and standard front axle. The body, with side entrances, accommodates five adults, has good baggage space beneath the rear seat and carries the recognized style of fenders and running boards.

Knight & Kilbourne—Silent Knight

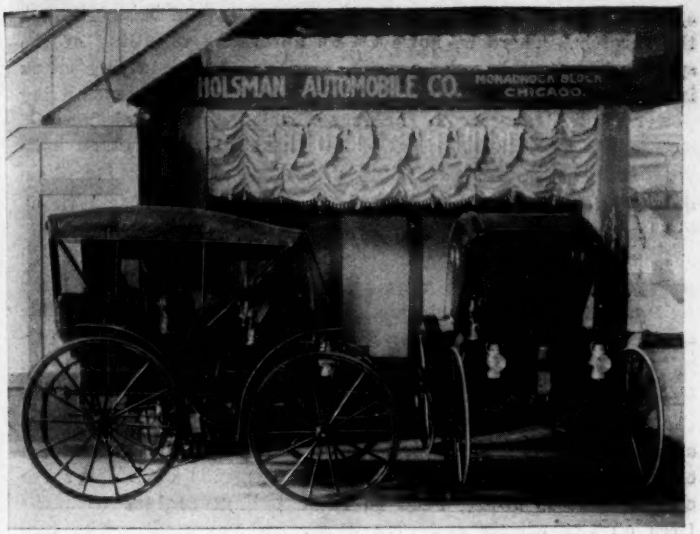
The Silent Knight car, shown for the first time at an automobile show, has the unique distinction of being the only gasoline four-cylinder, four-cycle motor without poppet valves for admitting explosive mixture or liberating the spent exhaust gases. The

SILENT KNIGHT CAR WITH REGAL BODY DESIGN



AIR-COOLED FRANKLINS WITH FOUR AND SIX CYLINDERS

motor is a sweeping innovation in gasoline construction and is a construction that has already proven to be no freak, but a design based on accepted engineering principles. The motor is of the four-cylinder vertical type with the cylinders cast in pairs. Between the cylinder wall and each piston is a pair of reciprocating sleeves that open and close admission and exhaust ports in the cylinder walls. On the right side of each cylinder at the top, or near the top, is a large port for admitting mixture from a Schebler carbureter. On the same side at the bottom of the stroke is an exhaust port through which the hot gases pass without being carried back to the top of the cylinder by the piston. On the left side of the cylinder at the top is a supplementary exhaust port. Thus in each cylinder are three ports—one at the right top for intake, one at the right bottom for exhaust and another at the left top for the exhaust remaining from the other. These ports are all of large size, that admitting the mixture being 5-16 inch high and 5 inches in length. The exhaust port at the right bottom is the same height but 7 1-14 inches long, and the remaining exhaust port on the left is of large size. These ports are covered and uncovered by the reciprocating sleeves within the cylinders, which are worked from an eccentric shaft within the crankcase, short connecting rods uniting the sleeves with the eccentric shaft. These sleeves have a total up-and-down movement, or stroke as it were, of 1 1-16 inch, whereas the piston stroke is 5½ inches. The bore is 4½ inches, giving a rating of 30-40 horsepower at medium crankshaft speed. In these sleeves are ports similar in size to the two exhausts and the inlet ports. One sleeve might be deemed sufficint to cover and uncover these ports, but the two are used in order that compression may be absolutely maintained. The inner sleeve is ¾-inch thick and the outer one 1-16. Both are made of gray iron turned on specially made gigs and ground on both surfaces, as are the interior of the cylinders and the pistons and rings. Following the movement of these sleeves is intricate, but interesting. One point specially impresses itself—on the explosion stroke the sleeves are traveling in the same direction as the piston and consequently there is not so much friction as in the case of a piston acting within a stationary cylinder. On the suction and exhaust strokes the piston and the inner sleeve are moving oppositely, but so slight is the sleeve movement compared with that of the piston that its opposition is a minimum. The cylinder heads are separate castings fitting into the cylinder bore as a cork fits in the neck of a bottle. They are held therein by vertical bolts. Each cylinder pair is well waterjacketed and the head pieces, although separate castings, are also waterjacketed, small connecting pipes sufficing to draw the water from the main jacket space to that in the head, and other pipes serving to return it again to the main jackets. Circulation is maintained by a gear-driven pump on the front of the motor, the point about the pump drive being that it is on a cross shaft, driven from the end of the



HOLSMAN VEHICLES WITH BIG WHEELS

eccentric shaft. A typical radiator forms the front of the bonnet. The crankcase is more massive than in the ordinary motor because of the greater depth required, as the cylinder walls and sleeves extend considerably below the top of the case. The case is an aluminum box-like housing, with a width and length about equal, and the crankshaft is supported on its three bearings entirely in the top portion of the case, the bottom part serving only as an oil basin. In the left of the case are two very large inspection plates through which the crankshaft and eccentric shaft can be reached. In these plates are other smaller ones for simple examinations. The case takes its support on the main frame pieces through a pair of cross steel tubes, one in front and the other to the rear of the crankcase. In each crankcase end are two large eyeholes to receive this tubing. Resting on the frame pieces and bolted thereto are brackets in which the ends of the tubing are received. The cylinder is then pinned to the supporting tubes. The external appearance of the motor is simplicity, there being nothing visible but four upright cylinders cast in pairs. Valve ports on either side are missing, as are valve actuating mechanism. As demonstrated every minute at the show, the visitor imagines the motor a two-cycle proposition. The crankshaft has its throws set at 180 degrees. It is a drop forging 1⅝ inches in diameter and has its end bearings 3¼ inches long and the center one 4 inches long. The eccentric shaft for reciprocating the cylinders is driven through a half-time gear enclosed and carried on the front end of the shaft. This eccentric shaft, as it is termed instead of camshaft, is a three-bearing shaft with a diameter 1⅛ inches, and is turned from the solid metal. Its end bearings are 3½ inches long, and the center one is an inch shorter. The bearings are made from bronze with a babbitt lining. The connecting rods uniting the shaft with the sleeves are made of bronze. The sleeves are set so that one leads the other in its movement by one-eighth of a revolution of the eccentric shaft. In the motor the designer uses a perfectly spherical combustion chamber, which is obtained by concaving the piston head and also concaving the cylinder head. Into the top of this space is introduced the spark plug, it being located directly in the center of the cylinder head. The ignition scheme, except the spark plugs, is practically all housed in a box on the right running board. In the front of the box is a timer driven by bevel gear and universal shaft from the rear end of the eccentric shaft. To the rear of this is the coil. Behind this is an Apple dynamo driven by shaft and friction pulley off the flywheel, and in the back of the box is a storage cell. The cover and front side of the box serve as the cover, so that when they are removed the entire ignition parts are exposed. Advancing of the spark and the control of the throttle are from the steering wheel. On the tops of the spark plugs are knife switches for cutting out the current for testing any of the plugs. The lubricating system in the motor is novel in that a splash in the base of the crankcase is not adopted. Beneath each crankshaft throw is an oil spray from which oil sprays over the throw, filling all grease cups. A portion is carried into the cylinder. All lubricant falling into the bottom of the case is drained off into the oil reservoir in the base of the case. The running gear of the machine is largely made from stock parts, as are the transmission features. In the flywheel is a cone clutch connecting with a stock three-speed and reverse sliding gearset and from this drive is by shaft to the back axle. Two mufflers are employed, one for each of the exhausts. The car frame work is of pressed steel in channel section, the frame pieces being straight through. The frame is carried on a set of semi-elliptic springs which present several novelties in that each spring has four shorter leaves on top, that act in the capacity of shock absorbers. The front axle is a one-piece forging with I-cross section. Wheels are 34 inches in diameter and carry 4-inch tires. The body is excellently designed and has basket-work trimmings. The hollow metal dash does not carry a single part upon it, and the upper half serves as a carrying cabinet. In the tonneau are additional disappearing seats. The wheel base is 112 inches.

Holsman Automobile Co.—Holsman

Made for service and without any pretenses of imitating recognized automobile design, this buggy automobile, as it has come to be called, has been fashioned for the coming season in practically the same manner as in vogue the past year, with the exception of a little carbureter change and one or two other small details. The running gear, with its 44-inch front wheels and 48-inch rear ones, each shod with 1⅛-inch solid rubber tires, remains, as does the drive from the countershaft through a ⅞-inch wire rope, in motor cycle form, to each rear wheel. The body part, of piano box style, is truly of the horse vehicle type in every line. So careful has been the imitation of the horse buggy that more than one glance is needed to perceive the differences. The motor is an opposed air-cooled affair with two cylinders, with bore and stroke 4 inches each and a horsepower rating of 10. The cylinders and crankcase are a single casting, so made that the bore of each cylinder is exactly in line with that of the other, there being no offset, as is common with opposed cylinders. Placing them this way does not require the connecting rods to act in the center of the cylinder bore. The rod in the front cylinder is to the right and that in the rear to the left. By doing this the bearings at the piston ends of the rods are all at one side of the rods. Each cylinder is cooled by a series of deep flanges, circular in shape and extending from the crankcase to the head. The heads of the cylinders are cooled by radiating fins and are screwed in position. The cylin-

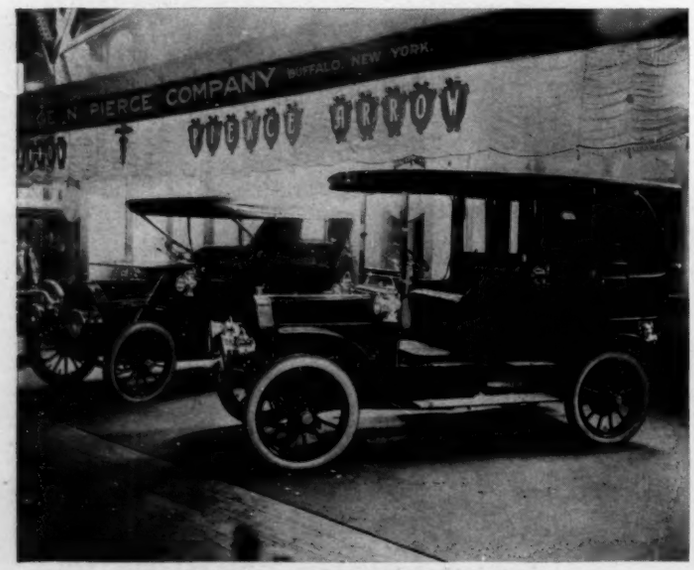
THE AUBURN WITH PLAN OF CHASSIS

AUBURN CAR REPOSING BENEATH ELECTRIC GLOW

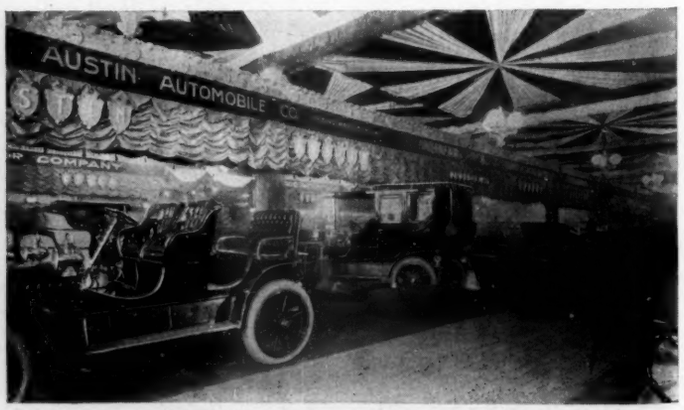
ders are reamed inside. The pistons, with the ends slightly hollowed, carry four compression rings outside of the wrist pin. The rings have lap joints, are of the eccentric variety and are ground to fit. On the inside end of each are two very wide oil grooves. The crankshaft, a drop forging with the cranks set at 180 degrees, is 1⅜ inches in diameter and revolves on two bearings, each 3¼ inches in length. The ends of the crankcase part of the motor casting have vertical slots, in which are dropped the bushings for the crankshaft. The crankcase cover has a couple of downwardly projecting pieces that cover these slots and hold the bushings in position. Inlet and exhaust valves are carried horizontally in one cage at the side of the cylinder ends. Both are carried horizontally. The inlets automatically operated being 1⅝ inches in diameter and the exhaust, made of the same diameter to be interchangeable, are actuated by pushrods worked from cams within the crankcase. A camshaft, in the accepted sense of the term, is not used. Inside the crankcase are two pinions, one in front and the other in the rear of the crankshaft. Each is driven from a pinion on it. On each pinion axle, where it extends beyond the crankcase, is carried a cam that works the pushrod. The mixture is furnished by a floatless carbureter carried close to the motor. Control of the mixture is from the hand grip of the steering lever, which can be turned to front or rear for controlling the supply. Ignition is by jump spark, with current supplied from battery. A coil is carried on the dash and a standard style of timer used. In controlling the motor the spark is neither advanced nor retarded, all control being through the throttle. There is, however, an automatic retarding of the spark when cranking the motor. As soon as the starting crank is released the spark is automatically advanced. In transmitting power from the motor to the rear wheels, the transmission and differential are discarded. On the crankshaft, continued suitably to the side for the purpose, are two sprockets for chain drive. Below the motorshaft is a swinging countershaft on which are two corresponding gears. Chains passing over these sprockets connect the shafts. On the shaft ends are two small pulleys over which run wire cables that pass over very large pulleys attached to the inside of the back wheels. The double chain system between the crankshaft and the countershaft permits of two forward speeds. On the crankshaft, between the two sprockets, is a double jaw clutch so either one or the other of the sprockets can be locked to the crankshaft for different speeds. In reversing a pair of small pulleys on the ends of the countershaft are brought into use. By means of a lever the countershaft is swung back so these pulleys contact with the tires on the wheels and give a reverse movement. The running gear is well made. Each axle, of square section, measures 1¼ inches to the side; the springs are long half-elliptics with an upward arch and with one end clipped beneath the axle and the other on top of it. The spring leaves, except the longer ones, are not continuous from front to rear, but are cut out in the center so a wood piece is inserted, to which the pieces for carrying the motor are attached. Steering is by cross lever connected with knuckles of the Elliott type. Plain bearings are used on the front and rear wheels, as they are in all parts of the machine. Braking is by throwing the reversing pulleys against the tires and also through a pair of brakes operating within the rope pulleys on the back wheels. In these brakes the braking surface is a piece of water hose attached to a metal shoe part, the hose being the friction part. Changes in speed are made through a short lever at the front of the seat, which has a right and left movement for the two forward speeds. Brakes are applied and the reverse given through one lever at the right and, as before stated, the throttle is controlled from the hand grip of the steering lever.

Tincher Motor Car Co.—Tincher

Tincher cars in the past, while not made in large numbers, have carried the reputation of being well built machines, capable of fast traveling and in every case fitted with high powered motors. The 1906 Tincher is a 50-horsepower proposition, with the motor connected with the rear driving wheels through a metal band clutch, selective type of gearset and side chains. Nickel steel is generally used in the car construction, such parts as crankshaft, camshaft, connecting rods, frame pieces, shafts in gearbox, jackshaft, front and rear axles and other parts being made from it. Not less noteworthy is the use of alligator metal for bushings in the crankshaft, gearbox and other shafts. This metal has been tested out by the Tincher concern for over a year and has, it is claimed, given such satisfaction during that time as to warrant its general introduction. Few changes

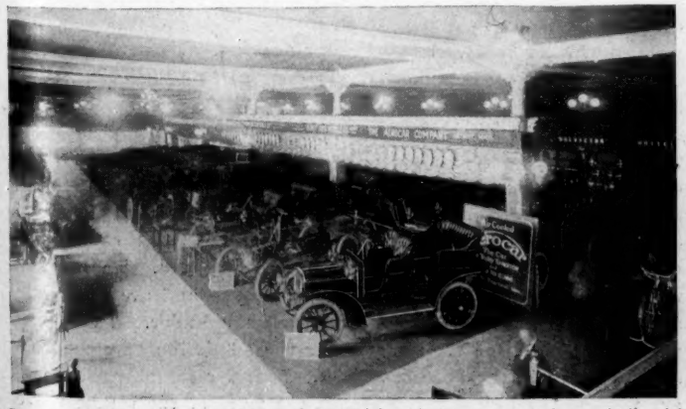


PIERCE ARROWS IN LIMOUSINE AND TOURIST STYLES



AUSTIN CARS IN THE COLISEUM SHOW

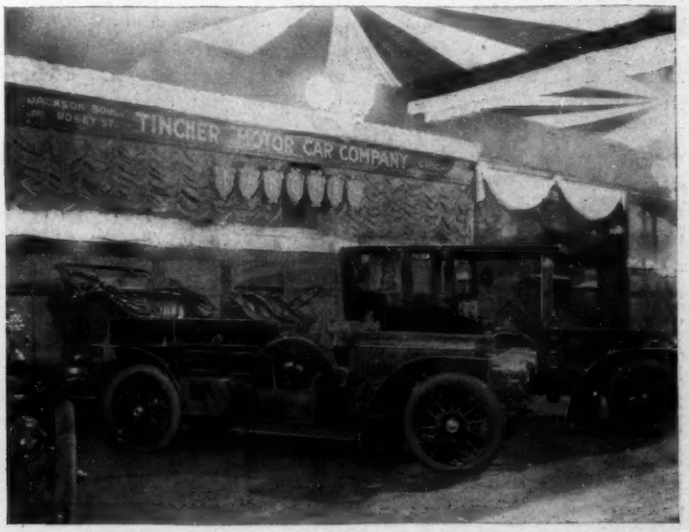
are made over the last year's model. These are confined to the introduction of a band clutch with bronze and steel gripping surfaces, a selective gearset with the gate quadrant for the change speed lever replaced by a lever with a rising and lowering motion for taking up the different shifting rods, the use of angle steel frame pieces instead of those of channel section and the adoption of a Tincher carbureter, in which a mechanically controlled auxiliary air entrance succeeds one previously controlled by a spring. The Tincher motor consists of four separately cast cylinders, each formed of three parts; a cast iron liner which forms the cylinder walls, and a head piece which has ports at opposite sides, one for the exhaust valve and the other for the inlet and a copper waterjacket. Four bolts, screwed into the liner part, secure the head piece in position. The waterjackets are spun from a circular sheet of copper and are rendered water-tight by having the bottom part spun into a groove in the cylinder wall and a copper ring sunk into the groove to hold the jacket part in place and form a tight joint. On the cylinder head the top of the jacket lies on the liner top and is clamped between it and the head piece. The head piece has a ground fit with the liner part, which aids in making a water-tight union with the copper jacket part. The crankcase attracts attention in that its interior capacity is very small, requiring little oil for the splash lubrication. Viewed from the side, the crankcase resembles four globular expansions, one for containing each crank throw. These expansions are of sufficient size to permit the crankshaft with its connecting rods working freely, and is supported on each side by four integral arms that extend out to the frame side pieces, obviating the necessity of a subframe. In order to further reduce the cylinder crankcase size, each cylinder is mounted on a pedestal made integral with the top portion of the case and is secured thereto by a set of four bolts. To all appearances the crankcase is divided into four separate compartments, but it is not, as the expansions for the first and second and the third and fourth cylinders are connected by a narrow gate passage so there is an even pressure within the case. Valves of extra large diameter—2¾ inches—are used. Each is made from nickel steel, with the head and stem integral and the former beveled. In opening them, two camshafts are needed, one on each side, both driven through enclosed half-time gears at the front. The peculiarity of the gear housing is that it is not integral with the motor but is carried from the side pieces of the chassis frame. Neither of the camshafts is enclosed within the crankcase; in fact, is not enclosed at all, having only four compartments for enclosing the cams and providing bearings for the camshafts. Both shafts are of 1-inch diameter and have the cams pinned in position. On the sides of the crankcase are four partly funnel-shaped pockets, with the bottom open into the crankcase and the tops inclined at 45 degrees to the vertical. A cover for these takes the form of an inverted funnel which acts as a sleeve for the pushrods. Between these two funnel parts are the bearings for the camshaft. The cover funnel parts are held in place by a cone-shaped nut threaded onto the camshaft bushings. When screwed into place the cone portion extends over the edge of both parts of the cam



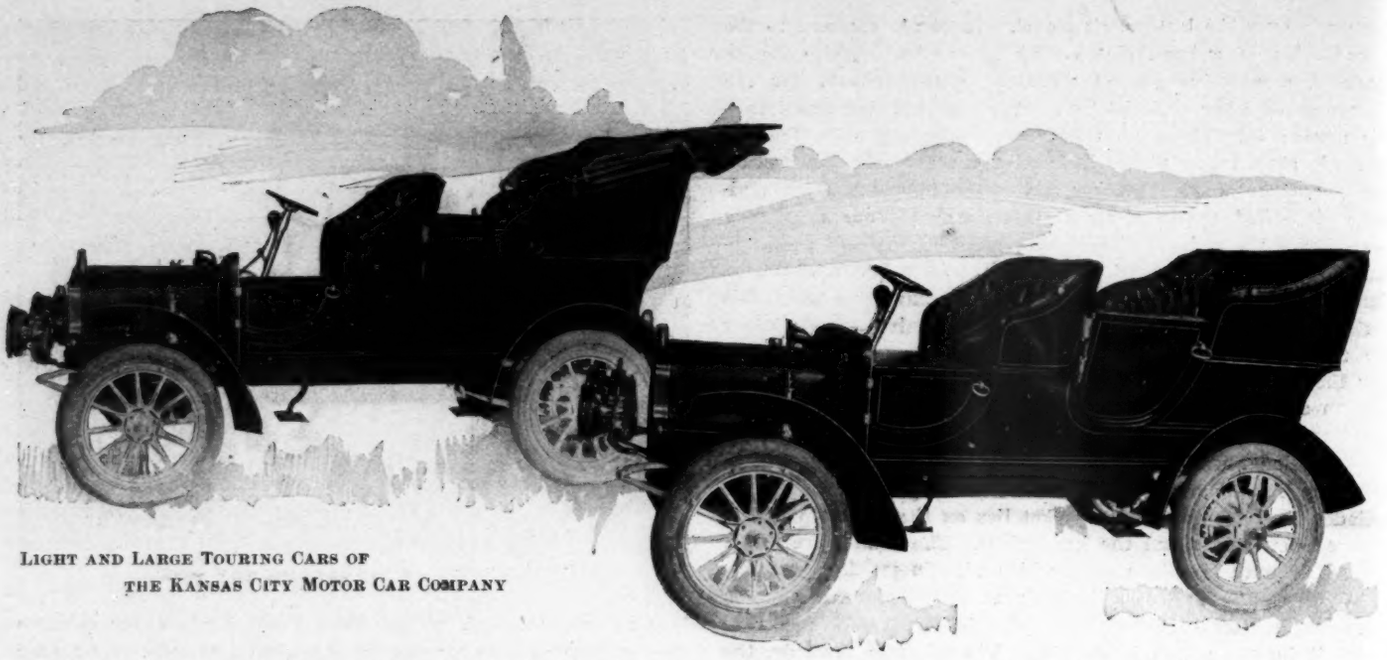
South Aisle in Annex Gallery

White Steamers in East Side of Coliseum

housing and holds them together. Removing a cover requires the use of a spanner wrench for less than 1 minute. By reason of this design either camshaft can be taken off without opening the crankcase or even removing the cover over the half-time gears. The camshaft proper ends in a flange at the front, which bolts to a similar flange on the end of the shaft, carrying the half-time gear, so that in taking out the shaft the bolts through the flanges have to be removed. By leaving the compartments containing the cams open to the crankcase the splash within the latter cares for the cams. The cylinders are lapped inside. The crankshaft runs on five bearings, that at the flywheel 4½ inches long, the three intermediate ones 3½ each and the front one 3 inches. All have a diameter of 1¾ inches. Pistons carry five compression rings above the wrist pins. The rings are lap-jointed and of the eccentric type, and are ground but not pinned against rotation. Wrist pins, 1¼ inches in diameter, are made of Shelby steel tubing and are pinned to the piston journals, leaving a bearing surface 3¼ inches in length in the top of the connecting rod. The bearing in this end of the connecting rod is made of bronze and the wrist pin is hardened. Crankpin bearings are 1⅝ inches in diameter. The water pump, carried on the forward end of a separate shaft, is of the centrifugal type, having a revolving part with a pair of openings. The Tincher carbureter is a waterjacketed apparatus, with the float carried in a separate chamber and having two air openings, one for supplementary purposes. The throttle is of the sliding drum style. When moved it accomplishes three distinct results: the passage leading to the motor is opened, the auxiliary supply



Tincher Touring Car and Limouines



LIGHT AND LARGE TOURING CARS OF THE KANSAS CITY MOTOR CAR COMPANY

is enlarged and the needle valve in the nozzle is adjusted. A wide open valve throttle permits the needle valve to open and more gasoline to flow. With a restricted throttle opening the nozzle is correspondingly obstructed, the object being the proper proportioning of gasoline and air at all motor speeds. Ignition is by two entirely separate systems, both of the jump spark type. In one system a La Coste magneto with self-cotained coil, interrupter and distributer, connects direct with the plugs through four short wires. The other ignition plant comprises a storage battery on the running board, a La Coste coil on the dash and a commutator carried on the top of a vertical shaft at the rear of the motor. By the use of a switch on the dash either sets can be used as desired or both can be used together. The crankshaft is continued beyond the flywheel in order to furnish a clutch bearing. The clutch is an aluminum wheel piece on the front end of the shaft to the gearbox and is covered with a bronze facing 3/16-inch thick, riveted in position. Supported on the flywheel is a metal band that fits over the wheel piece. This band is split at the top and has one end bolted to the flywheel and the other provided with a series of teeth into which mesh a small pinion also carried on the flywheel. On the pinion shaft is a short arm with ball ending which projects inwardly toward the clutch axis. On the shaft to the gearbox is a cone piece, termed a mushroom, that is so connected with the clutch pedal that when the pedal is depressed the mushroom is thrust forward and pushes against the ball end on the pinion arm. Thrusting it outward gives the pinion a part revolution sufficient to draw the band tight on the wheel part, thus giving positive drive. The entire clutch is carried in the recessed part of the flywheel and is enclosed in a dust-proof space. A clutch coupling is used in the shaft to the gearbox, so that without dismounting the gearbox the clutch can be taken down. The gearset differs in that direct drive is not used on any of the speeds. Both shafts in the case are made hollow. They run on plain alligator metal bearings, the mainshaft on two and the other on four. Two sliding units are used, both of which are on the main shaft and consist of a pair of gears sliding on four Woodruff keys. Like the crankcase the gearbox, made from aluminum, is rather odd-looking in that its interior capacity is very small because of the case having expansion parts for each gear. The jackshaft is carried on four races of balls, one race at either end and two others close to the differential. In addition to these are two large plain bearings. The side chains, of Diamond roller make, have one and one-quarter pitch and run over twenty-six tooth sprockets on the jackshaft and thirty-two tooth ones on the rear hubs. In oiling the motor and gearset a ten-feed Hill oiler is called into service. Four leads connect with the cylinder, one goes to the water pump, two care for the jackshaft and three enter the gearbox. The brakes are standard, being contraction bands, pedal-applied on the jackshaft, and internal expanding bronze shoes operating within in steel drums on the rear hubs for emergency uses. The frame pieces, of nickel steel with angle section, the top of the angle 2 inches and the vertical part 3 inches, are narrowed alongside of the motor and are supported by truss rods extending from the front to the rear. Carrying the gearcase and motor direct on these pieces gives good bracing construction, which is further assisted by cross braces. In front are 40-inch semi-elliptic springs. The rear ones are of the same width, but 10 inches longer. Both sets are of the semi-elliptic type, the front pair carried beneath the frame pieces and the rear pair thrown outside. I-section axles in front and rear are adopted. Both are dropped slightly at the ends. The dropped or end pieces in the front axle are riveted to the straight I-section piece instead of being welded. The four road wheels, 34 inches in diameter and shod with 5-inch tires, revolve on ball bearings.

Chicago Automobile Mfg. Co.—Chicago Steam Car

This machine is a new steam car, brought out during the past fall and which since then has done sufficient succesful demonstrating to warrant progressive manufacturing. The car is in every way a full-fledged touring vehicle, accommodating five passengers—two in front and three in a tonneau with access through side entrances. The wheelbase is 114 inches, it weighs 2,100 pounds and is propelled by a 20-25 horsepower four-cylinder motor, with steam furnished from a semi-flash generator of the spiral coil variety. The generator is carried in front beneath a regulation bonnet, with motor behind it, and from the motor drive to the back axle is through a positive jaw clutch coupling and a propeller shaft. In the motor are four cylinders arranged in pairs which are mounted at 90 degrees to each other, similar to the arms in the letter V. The cylinders are cast in pairs, quite gasoline-like, and are mounted on the crankcase in much the same form as are those in the Marmon gasoline machine. In each cylinder is a reciprocating trunk piston identical with those used in gasoline machines, each piston carrying its quota of compression rings, and connected with the two-throw crankshaft through a standard style of connecting rod. The valves, two for each cylinder, are of the poppet type and are carried in a port on the inside of the top of each cylinder. The larger valve, in the top of the port, is for the admission of steam. A smaller valve in the bottom of the port is for the exhaust. Both are worked through pushrod action, the stem of the intake valve

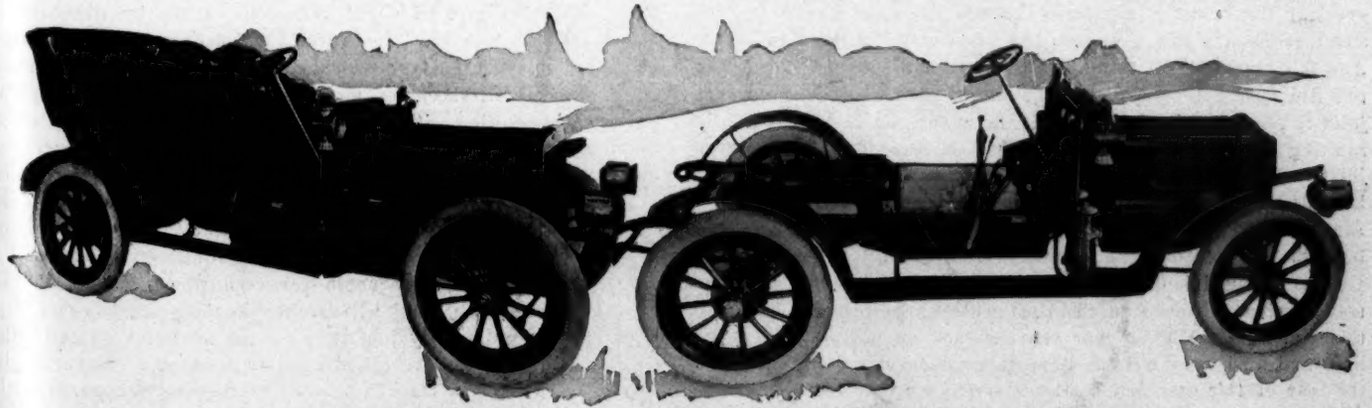
being within that of the exhaust, the latter taking the form of a sleeve containing the former. The cam is of double construction, one part for opening the inlet valve and the other for the exhaust. The piston is simple acting, steam playing on one side of it only. The camshaft is driven from the crankshaft by enclosed gears in the front of the case. The usual springs surrounding the valve stems are required for retaining the valves against their seats, the spring for the exhaust being exposed, and that for the intake encased within the housing, forming a guide for the bottom part of the rod. In the generator are conventional spirals of tubes nested together with a gasoline burner beneath them. A 15-gallon gasoline tank for fuel purposes is carried near the rear of the chassis frame. The differential housing on the back axle is split horizontally in line with the axle bearings and is split somewhat higher than this, that portion above the latter split serving as an inspection cap. Three brakes are used, a friction band acting on a drum on the front end of the propeller shaft, which is pedal-actuated, and two internal expanding brakes operating within the rear wheel drums. These are lever-applied. In the running gear conventional automobile lines are followed, the channel steel side pieces being narrowed in front to increase the turning angle. Semi-elliptic springs serve in front and rear, the latter being of an undulating shape instead of half-bowed. Steering is through a hand wheel with smaller concentric wheel for controlling the throttle. The wheels are 34 inches in diameter and carry 4-inch tires.

American Motor Car Co.—American

One of the new faces of the show is the American car built by this company at Indianapolis. The vehicle possesses all the prominent features of a standard four-cylinder car having a motor working on the four-cycle principle and generating 35-40 horsepower at 1000 revolutions. The cylinders are cast in pairs and the bore and stroke are 4 9/16 and 5 inches respectively. Each cylinder pair is an integral casting with ports on the left for housing the inlet and the exhaust valves which are actuated from one camshaft. Crankcase design is such that all motor parts are carried on the upper half of it, requiring only of the under portion the services of an oil reservoir. Between the cams and the bottom of the push rods are inserted forged arms which are pivoted on the right side of the case, the object of their presence being to relieve the rods of side thrust. The crankshaft, a nickel steel forging, runs on three white bronze bearings, the rear one being 4½ inches long. In constructing the crankshaft after the machining process, it is put aside and permitted to age. While in this resting process the metal in the shaft assumes its permanent form, after which it is finally ground to 1/10,000 of size. Connecting rods also are drop steel forgings with a cap secured by four bolts; the pistons are long and carry four eccentric rings above the wrist pins and five oil rings beneath the wrist pins to assist in lubricating the cylinder walls. All moving parts as well as the cylinder bore are fitted and ground to a finish and the cylinder axes are tangential to the crankshaft, the claimed advantage for this being a diminution of the side thrust of the pistons because of the less angularity of the connecting rods. Gears for driving the camshaft are of the spur type with spiral teeth and are enclosed in the aluminum crankcase. The cylinders, made from close grain homogeneous semi-steel, are machined within, then set aside to age for a period and are finally ground to size. Water cooling is by a tubular radiator forming the front of the bonnet with a bronze gear pump for accelerating the circulation. Mixture is furnished to the cylinders by a float feed carbureter which has as modern accepted characteristics a balanced piston throttle and an auxiliary air supply. In the jump spark ignition scheme, current comes from a three-cell, 6 volt, 60 amperehour storage battery and passes through a four vibrator French coil to the spark plugs which are carried about the inlet valve. A standard commutator is used. In lubricating the motor a six-feed Lunkenheimer oiler, carried on the dash and driven from the bevel gear of the vertical commutator shaft, furnishes oil to each of the four cylinders and to the two compartments of the crankcase. Beneath the front seat is a 17-gallon gasoline tank. A cone clutch engages with the flywheel. Its wide leather-covered face is intended to resist wear and give positive engagement, and a floating member is introduced between the clutch and gearbox, so that twists are not destructive to the shaft. Three forward speeds, with direct drive on the high and one reverse, are given. All gears are hardened so that the face is capable of resisting pressure whereas the interior of the metal is much softer. Drive to the back axle is by shaft fitted with two universal joints. In the rear axle the drive shafts to the road wheels are not called upon to support the car, the casing alone doing this. Ball bearings are used throughout in the rear axle. Two foot brakes of the internal style are located within drums on the rear hubs. The expanding shoes are of the floating bronze ring type and operate upon a steel drum. Emergency brakes worked by lever apply on the beveled pinion shaft universal coupling, the brake shoes being of bronze castings fulcrumed on the torsion rod and applied by revolving spiral cam. Control rests with an irreversible chain gear with spark and throttle finger levers on stationary quadrants above the whole. Brake clutch pedals are drop forgings having oval toe plates requiring a horizontal movement to operate. The gear shifting and emergency brake levers work on the right side of the seat, and the body made throughout of wood, is of the side entrance style with divided front seat, plain bonnet and straight dash. Characteristic features in the running gear are: 4-inch Continental tires in front and rear; 34-inch wheels running on ball bearings; I-section nickel steel drop forged front axle; 111-inch wheelbase; divided differential housing with the top half serving as an inspection cap; 9¾-inch road clearance at the front axle; 42-48-inch semi-elliptic springs in front and rear; pressed, cold rolled steel frame pieces with a substructure for supporting the motor and gear box; and a metal apron beneath the motor and gearbox for excluding the mud and dirt.

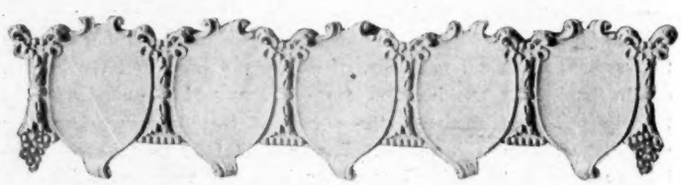
American Motor Truck Co.—Truck

Weighing 6,340 pounds and having a carrying capacity ranging between 3 and 4 tons, this concern's truck is especially designed for heavy service, the motor and gearbox as well as the running gear being built by the maker. In no part has strength been sacrificed and the combination of endurance and efficiency has been combined to a remarkable degree. The mo-



CHICAGO FIVE-PASSENGER STEAM CAR AND CHASSIS, SHOWING FRAME AND CONTROL PARTS

tor is carried lengthwise in front, beneath the seat and footboard, and has four separately-cast water-cooled cylinders, each with a 5-inch bore and 6-inch stroke, the rating at normal crankshaft speed being 32 horsepower. The cylinders are cooled through a large vertical-tube radiator beneath the footboard, the tubing nest measuring 3 feet 4 inches in height, 2 feet 6 inches in length and containing in all 166 feet of tubing. A 22-inch fan is carried on the front end of the crankshaft and from this the water pump is driven. The upper part of the crankcase supports the crankshaft and cylinders and is made of bronze, but the lower portion is of aluminum. Instead of splitting the case horizontally in line with the crankshaft bearings the split is placed angularly, so that when the bottom half is removed it is possible to look in from one side and see the entire crankshaft, because the diagonal split brings the bottom half nearly to the top of the case on the left side. This makes the result the same as having a large inspection plate on the side. The crankshaft is 2 inches in diameter, and runs on five babbitt-lined bearings; the connecting rods are made from drew steel. The valves, 1⅞ inches in diameter, are made interchangeable, and are carried side by side in the bottom of ports on the left side. A feature of the camshaft is that it can be taken out when the bottom portion of the crankcase is removed. To remove it six bolts are taken out, when the shaft with its gear can be lowered through the base. The pistons can also be taken out without removing the crankshaft. Each carries four compression rings and three oil grooves. The wrist pins, 1⅛ inches in diameter, are made hollow and are held to the pistons by set screws. Cylinders are bored 1/1,000-inch smaller at the top because of the extra heat generated in that part and the consequent greater expansion. Oiling is by a mechanical lubricator carried beside the motor. In the ignition scheme are the usual spark plugs, which take the current from a storage cell, a coil on the dash serving to produce a high tension current. The timer is carried close to the motor. Control rests with throttle and spark levers on the steering column beneath the wheel. In transmitting power planetary gearset with its axis lengthwise is used, drive being by shaft to a jackshaft and by side chains. The planetary gear gives two forward speeds and one reverse. On the top speed all gears are locked through a multiple disk clutch carried in conjunction with the gearset. In the clutch are nine fiber faced disks, four attached to the crankshaft and five secured to the gearset. This is the first car shown with a multiple disk clutch for high speed on a gearset of this type. High and slow speed ahead are gained through a lever working in the right side of the seat and the reverse is by pedal. The friction bands on the gearset are heavy and fiber-lined. Each is tightened on the drum through a double lever arm scheme, and on the forward speed there are three degrees of friction, first with slight engagement, second medium, and third when the contact is positive. The propeller shaft to the differential on the jackshaft is of 1¾-inch diameter, the same as in the jackshaft. Spur gears are used exclusively in the differential and the case is not supported except through a pair of metal straps from the top of the large aluminum housing to the framework above. As in the gearbox the gears are wide, those in the gearset having 2½-inch face and eight pitch. Timken roller bearings are used in the jackshaft and all road wheels. Drive from the jackshaft is from twenty-tooth sprockets to fifty-six tooth sprockets on the hubs. Whitney chains, ¾-inch wide and 1¼-inch pitch, are used. The front axle is of I-section, 4 inches high and 2½ inches wide; the rear axle is of square section, 2½ inches to the side. Frame pieces are of armored wood, the pieces measuring 6 inches in height and 2⅞ inches wide. The wheels are 36 inches in diameter, those in front carry 4-inch Goodrich side-wire tires, whereas the rear wheels are shod with 5-inch tires. The load-carrying platform measures 5 by 12 feet and is of the stake variety, though upon special order other forms of platforms are fitted. Speeds are anywhere from ½ to 11½ miles per hour.



FOUR-WHEEL DRIVE HAS SHOW OF ITS OWN

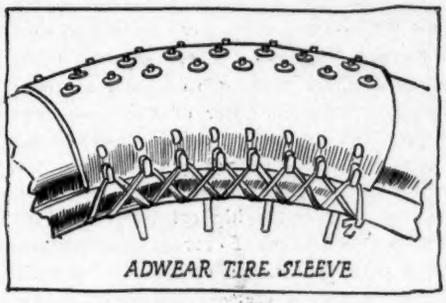
UNDAUNTED at not being able to gain admission space to exhibit its monster four-wheel drive truck in either the coliseum or armory this Milwaukee concern shipped its big machine by boat to Chicago and is daily engaged in demonstrating on the streets adjacent to the shows. Its arrival was delayed a couple of days by its breaking through a flat car that it was loaded upon for shipment to the Windy city and which accident necessitated a water trip to the show. The truck is in daily service demonstrating to out of town people what it is capable of doing. It is being driven over all the kinds of highways Chicago offers, including the few small grades the city possesses. As previously described in MOTOR AGE this truck has all four wheels drivers and steerers. To do this two live axles are used, and in the hub of each wheel is a universal joint in the axle driveshaft, so that the wheels can be turned and the rotating driveshafts still propel the wheels because of the universal joints. By having these joints vertically in line with the steering knuckle axis of rotation this construction is possible. A four-cylinder vertical motor, mounted lengthwise in front beneath the footboard and driver's seat, generates the power. A multiple disk clutch is the first essential in the transmission of power to the road wheels. In rear of this clutch is a sliding gear set, designed on accepted lines and made very heavy. A short shaft extends from the rear of this case and carries a spur gear that rests in a spur gear surrounding a differential in the shaft. Coupled with the front end of this driveshaft by universal joint is a similar driveshaft to the front axle. The spur gear on the gearshaft extension is superimposed on the differential, both being encased in a dust tight case and running in an oil bath. The shaft has bearings on a frame crosspiece. In each axle is a differential, thus there are three differentials, one near the union of the propeller shafts to the front and rear axles and one in each of the axles. Those in the axles are for caring for the turning of corners and that in the propeller shaft acts between the front and rear axles and takes care of slight variations caused by tire wear in the four road wheels. The wheel construction is heavy, wheels being of the spokeless type and having very wide wood tires, made from blocks with sheets of metal between the blocks. The hub part is a heavy ring with its outside a bearing on which the wheel revolves and within it is the driveshaft which at its outer end has a clutch coupling with the wheel part. The tierod for steering connects with the ring piece, so that turning the ring in or out gives a similar movement to the wheel. Having both front and rear wheels for steering purposes, a smaller turning angle for each wheel is needed than where the front wheels only do the guiding. This fact is particularly important as the universal joints in the driveshafts are called upon to work at a smaller angle. Control is through a vertical steering column, throttle and spark levers on steering mechanism, clutch and brake.

London Auto Supply Co.

This is a Chicago manufacturing concern which exhibits a number of made-up tops, one being for a touring car and made with a covering of pantasote of tan color. It is a combination strap and extension top, with four bows for support. The front curtain is arranged so it slopes inward, close to the driver's face, so that in case of rain no water can lodge on the celluloid window and thus interfere with the outlook. The side curtains for the back seats are arranged so the window portion alone can be removed, leaving an air space and at the same time enough of the curtain to act as a dust shield. Most of the London extension tops are fitted with straps. The top exhibited is partitioned by a curtain, so the tonneau is separated entirely from the front. A sample of a runabout top, in pantasote, with side curtains, three bows, storm curtain with window and straps, is also shown, besides samples of the material from which the tops are made. A line of glass fronts, both rigid and hinged, tire covers, lamp covers and dust covers is also on exhibition, making a most comprehensive exhibit of tops and other devices for the automobilists' protection.

Tokheim Mfg. Co.

Not a few changes have resulted as the fruits of experience during the past year in the products of this Iowa maker. To the already large line of gasoline storage tanks and gasoline and oil pumps has been added a lawn tank for storing gasoline outside, presumably on a lawn or other safe yet convenient place. This new tank has a 65-gallon capacity and is buried at any desirable depth beneath the surface. Rising to the surface, however, are two pipes, one for filling the tank and the other serving as the pump barrel. Both of these pipes terminate at the ground level in a small compartment with a hinged lid, provided with a lock for safe keeping. A hand-operated plunger pump serves for withdrawing the gasoline. The regular long-distance storage outfit to be used in garages has been improved upon in that the patent primer and filter is used. This primer is a deep cup-shaped piece, below the pump cylinder. In the top of this cup part is a valve, and a similar valve is in the pump piston. In the Tokheim pump the gasoline is allowed to drain out of the pump into the tank so as not to lose any through evaporation. A sufficient supply always remains in the cup, however, to prime the pump. This cup further serves as a filter in that the pipe from it enters the storage tank and passes to a short distance from the bottom, so that all dross is pumped out of the tank and collects in the cup. In the base of it is a screw cap which can be removed to clean the cup. The regular glass dome measuring tank shown a year ago is retained, but a self-measuring device is secured to the pump, so that while the gasoline is running through the dome it is nevertheless measured, the stroke of the pump being fixed so that a quarter gallon is lifted at each stroke.


ADWEAR TIRE SLEEVE

Adwear Auto Tire Sleeve Co.

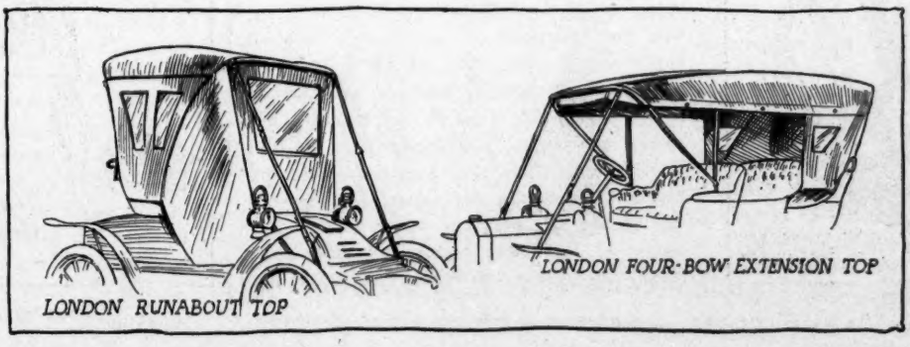
The Adwear sleeve, made from crome leather, is in five sizes for 2½, 3, 3½, 4 and 4½-inch tires. Two styles of sleeves are made; one with a reinforced tread partly secured to the sleeve proper by three rows of broad-headed rivets. The other sizes, without reinforced tread pieces, have the rivets for the prevention of skidding. Nine feet of lacing is required in attaching each. The patented portion of this sleeve is the double lock method of attaching the hooks, which are for lacing purposes. The hook piece passes twice through the tread part and has a top portion clamping the leather between it and the bottom part.

Joseph Dixon Crucible Co.

Dixon's flake graphite and graphite in numerous other forms, together with a complete stock of crucibles, is on hand. To these must be added the graphite brushes for commutator work which are new features in connection with this concern. The brushes made from specially prepared graphite are shown in a variety of forms suitable for any style of commutator and are shown with one end copper plated to aid in conducting the current. In all nine grades of graphite, suitable for automobiles, are shown. The oil graphite, which is a finely pulverized product made from the flake, being ground in sperm oil to prevent flying and increase its adhesive qualities, is useful for rubbing into bearing services when machines are being overhauled or in case of new machines. Graphitoleo, another preparation of Dixon make, is a combination of finely pulverized flake graphite and vaseline or petrolatum. It is used for bearings, axles, slides, guides, gears, and other places where light-bodied grease can be used.

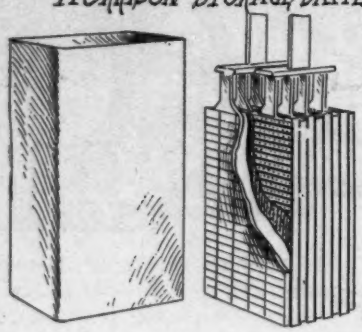
Hine-Watt Mfg. Co.

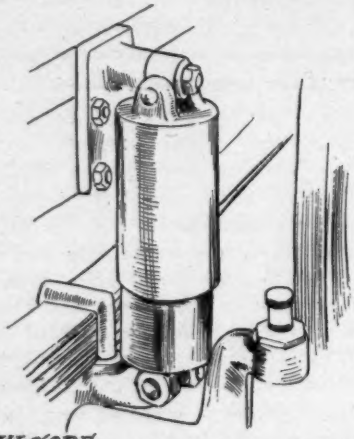
Generators in four different styles: three models of the parabolens lamps and barrel searchlights in different styles are leaders of the Hine-Watt output. Their Columbia generator No. 2B has capacity for 36 ounces of carbide and weighs 9 pounds. The generator is of rectangular shape, with its height double that of its width. In the bottom portion is a horizontal cylindrical carbide cartridge holder. This holder is divided horizontally throughout its length by a central gauze partition, the space in the cartridge holder beneath collecting the ash. The upper portion of the holder is divided in the center by a Y-shaped partition which contains a layer of cloth between its gauze pieces. At either side of this partition rests the carbide. The water entering from


LONDON RUNABOUT TOP

LONDON FOUR-BOW EXTENSION TOP

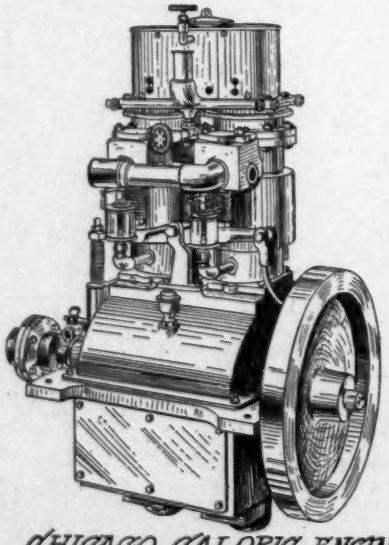
MORRISON STORAGE BATTERY





KILGORE SHOCK ELIMINATOR

PROSSER'S KRUPP CRANKSHAFT



CHICAGO CALORIC ENGINE

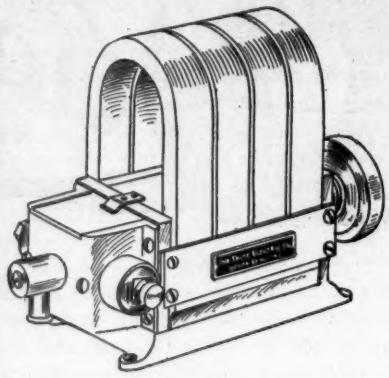
above falls into the center of the Y partition and is conducted through the cloth to both ends of the chamber. In this way it is well distributed along the carbide surface. A condenser is carried in the top of the generator for drying the gas. All of the other Columbia generators are remodeled, being in most cases enlarged and better constructed. An interesting lamp shown is the Columbia port and starboard yacht lamp, which has a pair of sides at right angles. The third side is in the form of a glass quadrant face. An acetylene burner or oil lamp can be used either separately or both together. All Columbia lamps with parabola lens are in large sizes. The small lens for condensing purposes is carried well back in the generator and being close to the burner concentrates all of the light and projects in parallel beams to the front. A large glass door in the lamp serves not only in keeping the dust out but also as a protection for parabola lens. Columbia searchlights are of the barrel type and are designed for attachment on the top of the dash, having a hand grip at the rear.

Tritt Electric Co.

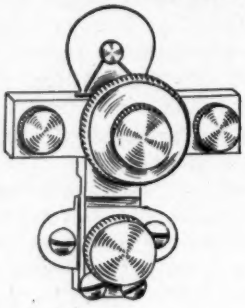
Ignition specialists, as the Tritt people call themselves, they have a full line of coils and magnetos. There are two types of jump spark coils, one of them a square box coil and the other of the dashboard type. The square box coil is designed for both automobiles and gas engines, the windings being of liberal proportions calculated to give the highest efficiency with a minimum amount of current consumption. It is equipped with a compound vibrator. There is also a six-terminal non-vibrator of the same construction as the other, but without the vibrator. The Rapid Fire jump spark coil is used on the dash and has only a single vibrator. The Vim magneto has an armature of the laminated type and is wound with a silk-covered wire. The base is of the swivel type, with a spring arranged so the tension on either side can be easily changed. The brush holders are taken out by one turn of a screw in front. The commutator is of hardened copper with the segments insulated with mica. Bronze bearings are fitted. The commutator is easily reached through a sliding lid.

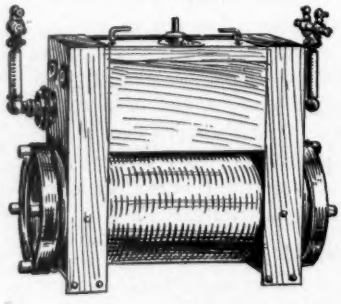
Chicago Caloric Engine Co.

The divided piston, air-cooled, 3½-horsepower, two-cycle motor, one of the several types made by this concern, is exhibited, the top portion of the piston a steel shell being used only in hastening the expulsion of spent gases. Mixture is taken in at the base of the cylinder between the upper and lower part of the piston, which at the commencement of the section stroke are separated, one being at the top and the other at the bottom. As the lower portion of the piston rises, the gases are forced past the top

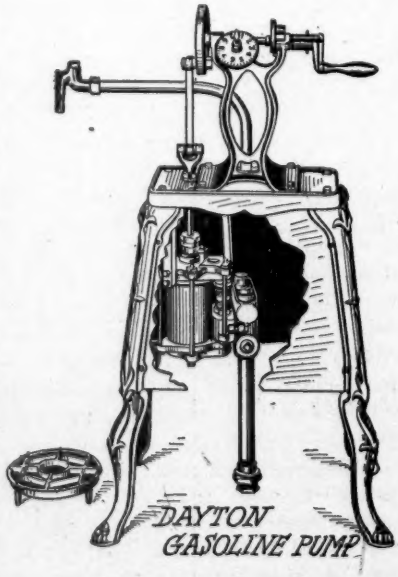


TRITT MAGNETO AND VIBRATOR





COLUMBIA GENERATOR



DAYTON GASOLINE PUMP

half because of the one compression ring on the top part, allowing them to pass beneath it when it is forced upwards by the pressure of the gas. At the commencement of the explosion stroke both parts of the piston are together and come down as one on the explosion stroke, and again separating for the up stroke. Ignition is by jump spark or hot tube, there being a vertical pipe extension on the top of the combustion chamber. In the top of the piston is a short, vertical, metal prong with the ribbed top that enters this tube and, being heated to a glow, causes ignition. The crankshaft is offset, being placed to the right of the cylinder bore.

Kilgore Automobile Air Cushion Co.

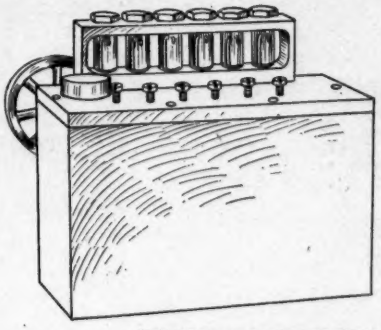
The Kilgore anti-shock utilizes an air cushion for absorbing the car's vibration. An air-tight cylinder with both ends closed is suspended from the frame of the car and within it operates a valveless piston connected with the car axle. In the piston is a bypass tube of very small diameter, through which the air can pass from one side of the piston to the other. The passage of the air through this tube is slow compared with the jar of the car and, consequently, when a wheel drops into a rut the car is carried on an air cushion below the piston, and on the rebound it is also cushioned on an air body above the piston, preventing rebound.

U. S. Jack Co.

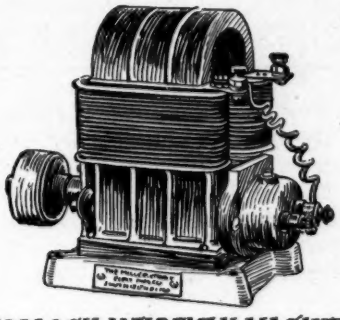
The U. S. jack is one of the simplest lifting devices on the market, with little to get out of order. It is, in fact, a screw jack, but so arranged that the handle used for turning the screw has a collar to keep it in place, thus obviating the necessity of removing the handle at any time. The thread of the screw is double and coarse, to give a quick movement in lifting. The top is made to fit any axle or spring clip. The screw of the jack is 1 inch in diameter and sufficiently long to raise cars having wheels from 22 inches to 34 inches diameter. The height is 10 inches and the weight 5¼ pounds. The same company shows what it terms a 3-minute repair kit for clincher tires. The outfit consists of three pieces, one to slide under the casing, one to act as a pry and the other to hold against one side of the rim and against the edge of the casing to force it from under the rim.

Knoblock-Heideman Mfg. Co.

The Quick Igniting Dynamo introduced by this house this year differs from most magnetos in that the lower portions of the three permanent magnets are enclosed in series wound coils of double silk-covered wires, so that all of the current coming from the machine passes through these coils and goes to augment the magnetism of the permanent magnets. The armatures are wound with a double silk-covered wire and are revolved at high speed by a friction pulley adapted to be driven off the rim of the flywheel or other convenient place. The magneto is designed for fast speed. All bearings are of phosphor bronze. The commutator brushes are made with flat surfaces; the base is of polished brass and the drive pulleys are made interchangeable. This type of dynamo is made for either make-and-break or jump spark ignition. The little generator weighs but 15 pounds and has length, width and height of 8½, 5 and 7¼ inches, respectively. All parts are readily accessible. By turning two screws one turn each the dome carrying the brush holders can be turned and slipped off. Other parts are similarly reachable. Other apparatus shown are the magneto generator, single cylinder coils, two and four-cylinder coils, motor cycle coils, primary spark coils and spark plugs, miniature lamps, dry batteries, carbureters, switches, mufflers, and other electrical appliances.

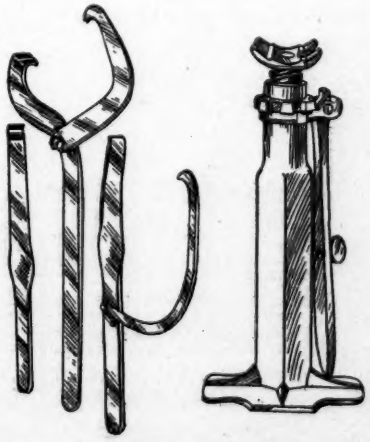


HANCOCK LUBRICATOR



KNOBLOCK-HEIDEMAN MAGNETO

CHICAGO AUTO ROBE SUPPLY CO.'S ROBE



U.S. TIRE REPAIR KIT AND JACK

Chicago Auto Robe Supply Co.

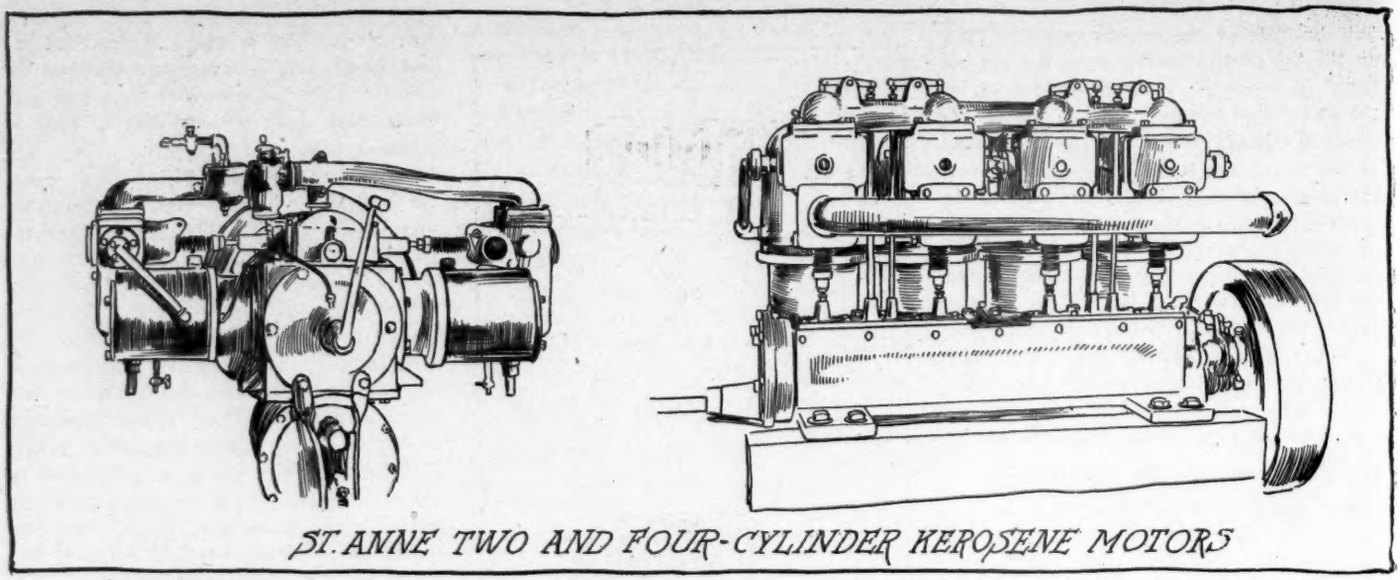
An automobile show is a good demonstrator of the necessity of warm winter clothing for motorists. One of the interesting winter garments shown in the line of drivers' robes is one made from many different materials and which is 54 inches long, so it comes well up under the arms and, being 60 inches around, gives plenty of opportunity to overlap the rest. The robe, while fitting closely around the body, is neither a plain robe nor a bag, but can be looked upon as a combination of the two and is made in all sizes.

Hancock Mfg. Co.

Two styles of mechanical oilers—type A with a bank of six pumps and type B with the same number of feeds but with sight attachments for carrying on the dash—comprise this exhibit. The pumps operate on the same principle and are characterized by not having any valves in their make-up. The six plunger pumps are placed vertically side by side. At the bottom of the pump cylinders is a revolving shaft with a three-port opening in it for each pump. On the up-stroke of the plunger the port in this shaft allowing oil to enter the plunger cylinder is in register with the bottom of the cylinder; on the down-stroke the rod makes a part revolution so the port leading to the feed pipes registers with the plunger cylinder. The pump is driven by belt, chain or ratchet from the motor. All plungers are separately adjustable, so the stroke of any one can be according to the needs of that feed. In the sight feed pump two pumps are needed for each lead—one pump forcing the oil to the sight glass and the other taking it from this glass and forcing it to the bearing.

Adams & Elting Co.

Auto-bright polish for brass and metal parts of automobiles; Ad-el-ite, a black or aluminum paint for motor engines; Ad-el-ite body polish and Ad-el-ite paint and varnish remover are the chief preparations of this Chicago house. All these



ST. ANNE TWO AND FOUR-CYLINDER KEROSENE MOTORS

preparations are made especially for automobile use and are sold in half pints, pints and other measure cans. Auto-bright polish is a dark-colored paste applied by cloth or hand. The motor engine paint contains neither oils nor vegetable matter and is warranted against burning off, and besides being used on engines is used for mufflers or pipings where considerable heat is produced. The different enamels are made in all standard colors as yellow, blue, orange, green and many special colors that are suited for automobile bodies. The company's body polish is a liquid and is applied in the usual way. The varnish remover is a liquid solvent for taking off paint, enamel, shellac or varnish even if several coatings of these have been applied to wood or metal work.

North Chicago Machine Co.

Four styles of vertical gasoline motors, which can be run either on the four or two-cycle principle, are manufactured by this concern. The one, two, three and four-cylinder motors follow the same design. The method of interchanging from two to four-cycle is accomplished by a double set of cams on the camshaft, one set being for the two and the other for the four-cycle operation. On one end of the camshaft is a half-time gear and on the other end is a gear of half this size, giving twice the speed to the shaft when two-cycling. The shaft can be positively connected with either gear through a short lever. The crankcase is designed for two-cycle purposes, being very small and having the gases conducted into it so as to obtain compression for forcing them into the combustion chambers when two-cycling. Mechanical inlet and exhaust valves are used, the inlets being at the bottom and opened by horizontal push-rods, and the exhausts in the cylinder heads and worked by pushrods and rocker arms. A spherical combustion chamber is obtained by concaving the piston head and correspondingly arching the cylinder head. Cylinders are bored and the piston rings turned. The two-cylinder machine has the cylinders cast together and has a rating of 12 horsepower when acting on the four-cycle stroke and 20 horsepower when operating on two-cycle lines. The bore and stroke are 4½ and 5 inches, respectively. In other sizes cylinders are in pairs.

Chicago Pneumatic Tool Co.

This company's speed recorded remains practically as it was a year ago, consisting of a speed and distance recording devices. Speeds in miles per hour up to 85 are shown by a pointer on the circular dial and a complete record of speeds throughout a trip is registered on a spool of paper encased in the device. The needle making the impression is held down on the bottom portion of the paper by a coil spring and is raised by a centrifugal oil pump registering speed proportionate to that at which the car travels. Consequently, the faster the car goes the higher will the needle indicate on the paper and as the paper also passes over one spool to another at a speed proportionate to that of the car a complete record of the trip is shown by a line on the paper. The Little Giant storage cells, as a year ago, are shown in twelve sizes, with amperage running from 25 to 100 and a voltage of any height. The launch battery used by navy revenue cutters is shown for the first time. It carries ninety-six cells, giving 350 amperehour capacity with 2 volts to the cell. The cells are retained in the battery framework by patented aluminum clips. Rubber strap handles are used on the regular sparking batteries. The line of electric drills is a new one and comprises drills of sizes from the smallest to those measuring 2¼ inches in diameter. The charging rheostat is furnished for recharging many of the company's sparking batteries. It consists of four horizontal bars of asbestos, around which are wrapped wires capable of giving a 34-ohm. resistance. The device is small and intended to take the place of lamp racks for resistance purposes. Air pressure drills in all standard sizes are still made.

CHICAGO PNEUMATIC TOOL CO'S CHARGING RHEOSTAT

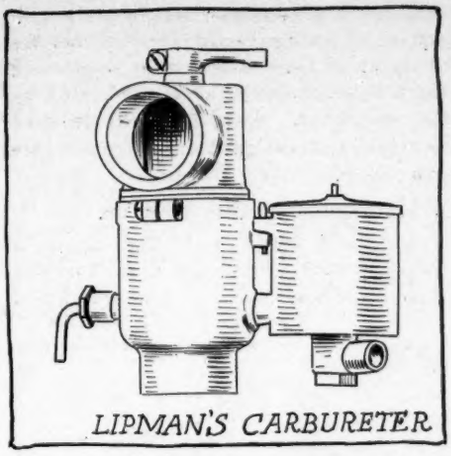
George Barcus & Co.

Two styles of the Perfect kerosene motor made by this company are featured, provision being made in them for using either gasoline or kerosene as a motor fuel. The smaller motor, a two-cycle opposed one, has a rating of 20 horsepower, with cylinders having a bore and stroke of 5 inches. The larger machine has four vertical, separately-cast cylinders, each 5 by 5 inches. The rating is 40 horsepower. In the horizontal motor jackets are used on the cylinder walls and the head and valve ports are air-cooled. The water-jackets are leaded into a cylinder groove at the inside end, and at the outer end are flanges, the flanges serving as a gasket between the cylinder head and the walls. The valves, automatic inlets and mechanical exhausts, are carried in cubical-shaped ports on the tops of the cylinder ends. The exhaust valve is on the inside of the port, that part closest to the crankcase, and the inlets are in the top of the port. In the center of these ports is the miniature radiator for heating and vaporizing the kerosene when used for fuel purposes. This radiator is a series of small tubes through which the exhaust, conducted by a separate pipe from the

cylinder, passes, heating it and then running by a by-pass to the main exhaust pipe beyond the exhaust valve. It is important to understand in this motor that although the same carbureter is used with the kerosene, yet the kerosene is not actually vaporized in the carbureter, but depends upon the heat in this vaporizer. In starting the motor, the first few revolutions are on the gasoline fuel, then by a switch close to the carbureter, the kerosene is turned on and a slight needle valve adjustment makes the carbureter suitable. The cylinders, pistons and rings are all ground. Cast iron valves, 2 inches in diameter, are utilized. Three piston rings are required. The crankshaft, 1¾ inches in diameter, turns on a pair of bronze bearings 4⅞ inches long. Connecting rods are drop forgings. Wrist pins have bearings 2½ inches long and the crankcase is a cubical box in which the cover forms a casing supporting the camshaft and the pushrods and the three sides have circular openings for receiving the crankshaft bearings and the two cylinders. A mechanical lubricator is carried above the crankcase and has leads to the cylinder walls and crankshaft bearings. The four-cylinder motor has the same cylinder construction, using copper waterjackets, with the cylinder heads cooled by radial flanges . Valve ports are on the cylinder tops at the left and have practically the same construction as in the horizontal type, except that the inlet valves are mechanically operated by means of vertical pushrods and rocker arms. A peculiarity is that the pushrods pass through the center of the intake piping. The same radiator scheme for vaporizing the kerosene is adopted.

Speed Changing Pulley Co.

The Universal carbureter and the Carrico, four-cylinder, air-cooled automobile motor comprise the exhibit of this concern. The Universal carbureter has two peculiar features—the float is a ring-like cork piece working in a chamber with a

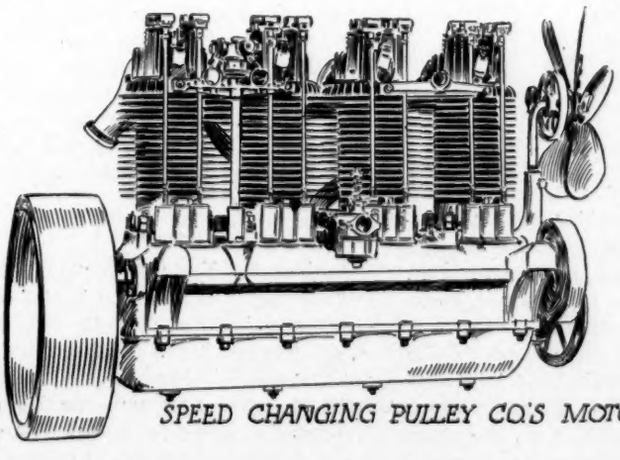


LIPMAN'S CARBURETER

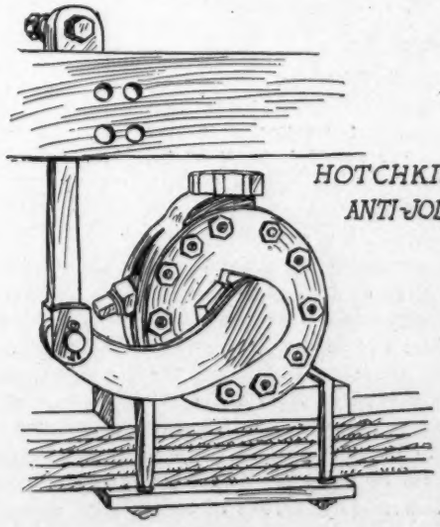
concentric needle valve and directly above these is the mixing chamber. To the bottom of the float is secured a cross rod which passes through a slot in the needle valve stem, the needle valve being almost on a level with the top of the float. The passage of air into the mixing chamber is controlled by a very light aluminum thimble which has a wheel-like top with air openings. As the air is drawn in, this thimble is raised proportionately to the motor suction, its movement being slightly restricted by a spiral spring. The term Universal is applied to this carbureter because of the fact that the throttle valve, which is a revolving shield for covering a circular opening in the side of the mixing chamber, can be operated so that it works at either the right or the left side of the opening, a slight adjustment only being necessary to effect this change. The Carrico motor, rated at 20 to 24 horsepower, has four vertical cylinders with a bore and stroke of 4 inches. The cylinders are cooled by sixteen circular flanges, each 1¼ inches deep, and the designer has been careful to avoid lugs or projections in any part of the cylinder casting. The heads are integral and cooled by similar flanges. In each are two openings for receiving the inlet and exhaust valve cages. These valves are of a peculiar shape, being concave on the bottom and convex on top. They are made 1⅝ inches in diameter and are of nickel steel with 35 per cent nickel. The valve cages rest on rather than sit into the cylinder heads, and in removing the valve it is first necessary to loosen the inlet and exhaust piping, after which both valves can be lifted out. A crankshaft 1¾ inches in diameter runs on three Parsons' white brass bearings. The camshaft, ⅞-inch in diameter, is carried on three bearings; cams are keyed in position, and it is possible to remove the entire camshaft through the bearing opening in the front end of the crankcase. In designing the crankcase, which is split horizontally into an upper and lower part, the designer has placed the split 1 inch below the crankshaft center. The lower half of the case is an aluminum casting and is partitioned into four compartments for oiling purposes. The commutator on the end of the vertical shaft is supported in a bronze casting which has supports for the high and low tension wires, so that more vibration is taken off the terminals.

Auto Accessories Mfg. Co.

Automobile tops, Sterling lamps, a complete assortment of Sterling dusters and rain coats, besides many regular supply articles, such as spark plugs, battery connections, horns, switches, jacks, tire protectors, and voltmeters, are exhibited by this Detroit house. Sterling tops are of the four-bow variety, with steel sockets. The front curtain or, as it is generally termed, the boot, contains large windows, and is featured, in that it rolls from the bottom and is entirely concealed when up. It also has the advantage of being fastened from the inside, so the operator can shut himself in and get out without assistance. Sterling lamps are made with parabola lens and are unique in that the parts are not soldered, rivets being exclusively adopted. An attachment is secured to the headlights by which the mirror reflector, should it become broken, can



SPEED CHANGING PULLEY CO.'S MOTOR



HOTCHKIN ANTI-JOLT DEVICE

be removed by simply loosening a box on the rear cylinder. One top exhibited is fitted with the automatic headlight bracket, by which the headlights of the car are always parallel with the driving wheels, the light being thus constantly on the road ahead. In the lamps, German silver reflectors are used throughout. The searchlights have 7-inch Bausch & Lomb mirror lens reflectors. In the clothing line, one raincoat with a double front is featured. It has wind protectors in the sleeves and is made so that whenever the person is seated there are at least two thicknesses covering the knees and lap.

Long Mfg. Co.

Coolers, hoods and spiral-finned tubing make up the exhibit of this concern. The new radiator is built with an outside casing and a removable core so all the weight and strain come on the outside shell. When repairs are necessary removing the core enables one to get at any tube or leaky place in the radiator without any trouble. A new ball-bearing fan goes with this radiator when specially ordered. The spiral-finned radiator is made of brazed brass tubing with a spiral copper flange, except where the ¼-inch tube is used. The coil radiators are all of metal construction, the plates at the ends being made of galvanized steel, punched and countersunk to receive the tubing and bends. When the tubes are inserted through the plates and the radiator is assembled the bends are sweated on. A full line of hoods is shown.

Volta Battery Co.

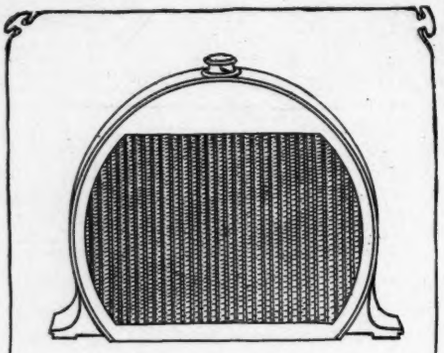
The feature of the battery manufactured by this concern is that its maker has abandoned the use of the hard rubber cell, using in its place a solid metallic casing. The elements are fitted tightly into this metallic cylinder from which they are separated by soft rubber cushions. Then the top is forced down and soldered. There are two types shown—C in 4, 6, 8 and 10 volts and of 40-ampere hour capacity, and D of 4, 6, 8 and 10-volt 60-ampere hour capacity. The D type is adapted for electric headlights and for interior lighting of limousines or other compartments.

Ventilated Cushion Co.

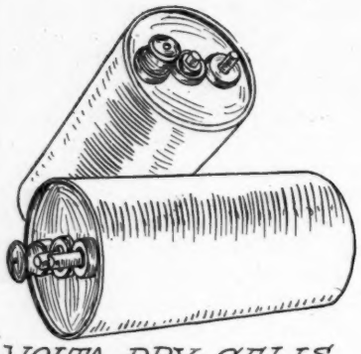
Something new in the way of cushions is shown, not only big tonneau seats with luxurious springs, but smaller ones for runabouts, too. The principle involved includes a double set of springs and a bellows-like device which makes one imagine he is sitting on air. In the cushion designed for tonneau use it is noticeable that a man sitting alone on it does not slip to one side. The cushions are perforated by many eyelet holes and as one jolts up and down according to the condition of the road the air is sucked in from the front end, working like a bellows. The pressure closes a valve and this forces the air out through the holes in the top. The main springs work individually instead of as a mass, each independent of the other. When the road is particularly bumpy the auxiliary set of springs comes into play and the occupant of the tonneau after exhausting the first set finds the bump eradicated by the second set. Seats made on the same principle and designed for office use are also shown.

Fowler-Manson-Sherman Mfg. Co.

One motor cycle, with Thor motor, a similar motor cycle with a wicker side chair attachment and the third wheel, and



LONG RADIATOR



VOLTA DRY CELLS

VESTA IGNITION BATTERY

a similarly designed machine with the cubical carrying compartment taking the place of the wicker seat, comprise this exhibit. In all three machines identical construction is found in the frame work of the motor cycle parts and in the motor and its attributes. The diamond frame is of conventional design and has the motor forming a portion of the seat post, the short post carrying the seat entering the head of the cylinder. A three-piece crown is used, the gasoline tank is carried beneath the top frame piece and close to the front and between the rear end of the tank and the motor is the carbureter. The battery is carried behind the seat and the small cylindrical muffler has its location beneath the base of the crankcase. Control of the throttle is from the right-hand grip, the spark being adjusted by a finger lever beside the handle bar post. Chain drive is furnished. In case of the tri-car with the wicker seat, a long axle is used between the rear wheel of the motor cycle and the third wheel. The wicker seat, taking its support through a C spring above this axle and the footboard, is carried on a curved tubular piece that connects from the end of the axle with the crown of the motor cycle part. In the tri-car the support of the carrying compartment is practically the same as where the wicker seat is used. The compartment is large and has a drop door forming the rear half of the car. A brass railing is provided in case of emergencies when parcels may be carried on top.

Standard Carriage Lamp Co.

On this stand are the Standard automatic generator, the Solvictor headlight and a line of square brass oil side lamps. The generator is made on the theory that no more pressure of gas is required to supply a number of lamp tips than is required for one, the volume of the gas only varying with the requirements. The amount of water supplied to the distributor of the carbide holder automatically adjusts itself to the amount of gas flowing through the lamp tips. The side lamps, in two styles, have oil fonts with a positive locking device, the wick being manipulated by a worm gear. On the headlight the construction is such that the lens may be removed when a flood of light is desired in touring on unknown country roads.

Continental Head Light

Because of its globular shape, Fireball is the name bestowed upon a unique design of headlight for acetylene gas burning. The case part is made from one piece of heavy gauge, polished brass, which is spun into ball shape, eliminating seams or brazed surfaces. On the top is a slightly conical vent; at one side is a hinge and the other side a fastener, these being the only projections interrupting the perfect spherical contour of the lamp. The door conforms in shape to the body and is of sufficient size to carry a large condensing light.

Vesta Accumulator Co.

Besides the Vesta 60-ampere hour ignition battery, this company is also exhibiting something new in the way of the Vesta electric horn. The battery is securely packed in hard wood and provision made to avoid free acid running out or spilling. It is made in standard sizes—4-volt, 6-volt and 8-volt. The electric horn is worked by pressing a button on the

steering wheel, it being operated by the sparking battery. There is a wire leading up the post which is connected to a spring on the wood rim. Pressing this makes contact with a metal spoke leading to the ground. The other wire leading from the horn is attached to the battery side and is not grounded. Its musical effect is like that of a high class reed horn with its undesirable features eliminated. The sound producing part of the horn consists of a metal diaphragm which is caused to vibrate through the influence of an electro magnet which has its winding connected with the battery. In front of this diaphragm is another diaphragm with an intervening air space between them which serves in the capacity of an intensifier so that the vibration of the first diaphragm after passing through the air space creates stronger vibrations in the second diaphragm, thereby giving more intense sounds.

Dayton Folding Tonneau Co.

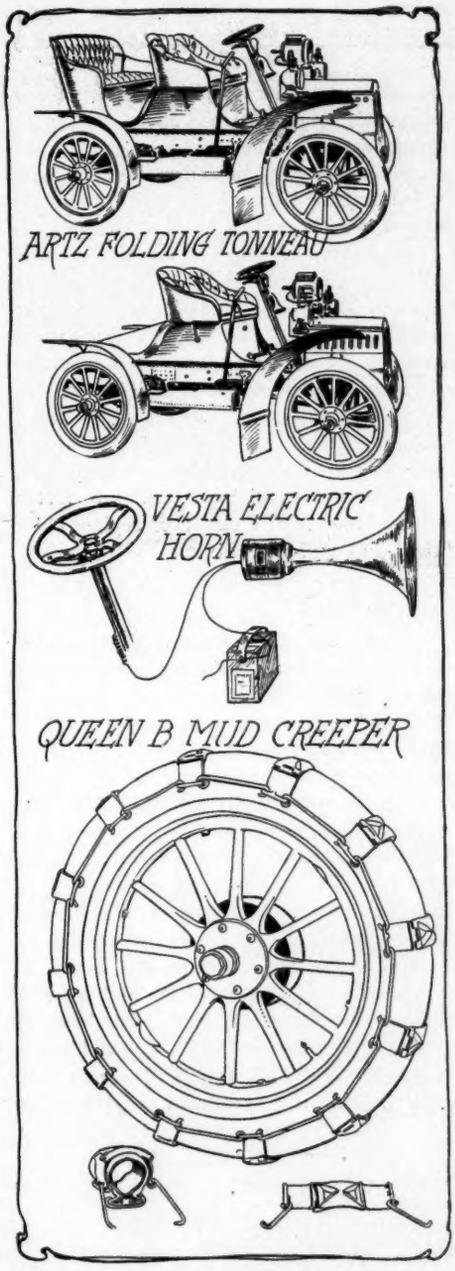
A demonstration of the ease with which the Artz folding tonneau is opened or closed is given. This attachment allows of two adult persons riding with comfort on the back seat. When folded the tonneau attachment is hidden within the curve of the back. The upper half is a swell and the lower half is of the tulip type. It is no easy task to meet these requirements, the tonneau being made with five layers of veneer, with the grain in the alternate layer crossing. These are glued together under a pressure of 162 tons. The inner edge of the back is reinforced by an ash strip where the hinges are screwed to it. The sill of the back is a cast-iron piece membered up outside of the back, where it forms a moulding. Painted and upholstered, the tonneau weighs but 70 pounds.

Queen Mfg. Co.

Queen mud creepers and tire protectors are intended for use in mud or snow. For the ordinary tire twelve semi-circular metal clasps, encircling the tire and extending on the sides close to the rim are distributed throughout the tire circumference. Each clasp is a three-piece one. A tread part with rough surface extends across the tread. Hinged to the ends of this are side pieces. The dozen clasps are held together by a series of links, one on either side of the tire, one end of the link being secured and a hook on the other. In case of a blow-out the affected part of the tire can be entirely covered with these clasps, which are close enough together to hold one to the other by short links of any desired length.

Lang & Lyon

The Harley Davidson motor cycle, with a 3¼-horsepower, single-cylinder, air-cooled motor and drive by means of flat belt, has several new features in American motor car construction, among which is noted a friction clutch operating on the left end of the crankshaft, by means of which the motor is cranked as in an ordinary automobile engine. With the motor running the clutch is engaged by knee action and a vertical lever, with the yoke at the lower end, engaging the clutch part and rising close to the center bar of the machine between the knees of the driver, so that a slight pressure on top of this lever gives positive clutch contact. The Davidson trolley, which is an idler for tightening the belt, is normally held in tension by a coil spring on a rod extending angularly to the front and terminating near the center of the diamond portion of the frame. From this oblique rod is a lever close to the handle bars, so the tension of the belt can be adjusted while the machine is running. The motor, with a 3⅛ by 3½-inch bore and stroke, is carried in the center of the diamond in a loop frame work and inclines slightly to the front. It is held to this loop part by three clamps, to which the motor lugs are babbitted.



The valve port is on the right and the cylinder design is so simple that the top flanges are continued around the cylinder and valve port. In all, seventeen of these flanges, each 1 inch deep, are used in the cooling process. The frame work is made of heavy gauge tubing; a three-piece crown is used; Thor hubs are fitted in front and rear and 28-inch wheels carry 2¼-inch G & J tires.

Excelsion Supply Co.

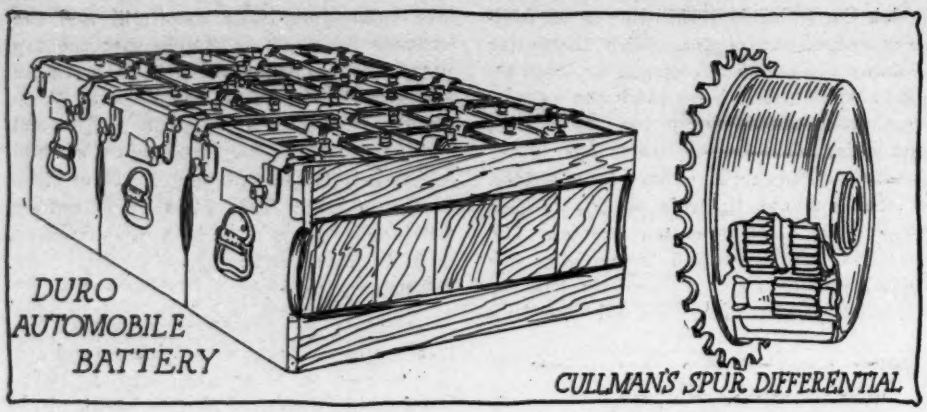
Lamps of all designs—headlights, side lights, tail lights, searchlights—and of such makes as Solar and Gray & Davis are suitably displayed at this booth. Bullet shapes are in evidence, as are parabola lens. Such coils as Kingston, Splitdorf and Pittsfield for one, two, three, four or six-cylinder motors are exhibited. Other sundries are Gilbert tire covers and sleeves; Skinner & Skinner's compound tire pump with pressure gauge on the bottom; Adwear tire sleeves in sizes for all standard American-made tires; automobile clocks for attachment on the dashes of cars; automobile lifting jacks, including such makes as U. S. and Springfield; Gabriel horns and Soot-Proof, Jewel and other spark plugs. Monarch polish in all sizes of cans is at this stand.

Standard Oil Co.

Nine lubricating products suitable for automobile service comprise the lubricating menu of this universal concern. Aside from the inherent merits of these nine products, a fact valuable to motorists is that these oils can be obtained in any city in the world. For automobile use Mobiloil No. 1, a heavy dark lubricant, is intended for steam cars making use of superheated steam in the cylinders and also for those having rotary valves and single-acting cylinders. Mobiloil No. 2, a dark reddish oil, is for steam vehicles not using superheated steam in the cylinders. Mobiloil No. 3, a heavy red lubricant, is for air-cooled gasoline machines and water-cooled cylinders where only a portion of the cylinder is waterjacketed. Mobiloil No. 4, a red lubricant of light weight, is for water-cooled cylinders and electric machines. Of these four cylinder oils, the heat-withstanding qualities are in the order No. 4, No. 3, No. 2 and No. 1. Mobilubricant is for compression and other grease cups used on automobiles.

Motor Car Supply Co.

The Grey-Hawley chime shown in a short brass tube with three compartments within it. Each compartment is of a different length and so capable of producing a different note when a current of air is directed into it. The chime, with its three notes, is operated by a pedal, a light pressure allowing the exhaust gases to enter the tubing. The automobile chimes of the Sullivan Electric Co. are also shown. They are of the three-pipe type, with the pipes square instead of round. Near the base of each pipe is an adjuster by which the pitch of the pipe can be altered. Bearing



scrapers are a novelty shown. They are in sets of three and are intended to scrape plain bearings, to remove worn particles or hardened matter. Each scraper resembles a curved knife, with a very thick scissor-like blade. The Schug coil this season has a removable cover part at the front base so the terminals of the wires to the plugs can be examined without taking the coil off the dash. A. R. Mosler's new eccentric timer is on hand. The revolving brush is an eccentric piece running on ball bearings and has a ball contact with the wire terminals with spring behind ball.

Chicago Battery Co.

Duro sparking batteries are now made in sixty-four sizes, an increase of 75 per cent over the number of styles made last year. These batteries are now put up in either copper or wood case, the latter being this year's introduction. The current produced ranges from 4 to 18 volts, and from 20 to 130 amperes. Besides its long line of sparking batteries the company has a comprehensive electric lamp display, including electric headlights, searchlights, dome lights for interiors and the combined exploring lamp and battery tester. This lamp has a long wire which can at its terminal be attached to the car battery, then being ready for use in examining any part of the car. The light is not large and has a handle for convenient handling.

Turner & Fish

Indestructible steel wheels of all diameters from 28 to 36 inches, intended for pleasure cars and commercial vehicles, are the leading product of this Chicago house. These wheels are made from pressed sheet steel and consist of two opposing disks, the disks being equal in diameter to that of the wheel, and when bolted together form a spokeless wheel weighing from 11½ to 19 pounds. By stamping the disks so as to give them a spoke-like effect, a good imitation of the artillery wood wheel is effected, although the sheet metal fills the space between the spokes. The two opposing disks are held together by two circles of 3-16-inch rivets, one circle near the outside of the wheel and the other midway between the tire and the hub. At the peripheries the disks are turned at right angles, forming ¾-inch flanges, over which steel rims as used on regular wheels, are shrunk. Rims for any design for pneumatic or solid tires can be used with equal facility. The hub portions of the wheels consist of a heavy bridge part which extends between the disks which are bulged out near the hub. Through this bridge part, the thimble for the bearing spindle is inserted and on the outer part of the hub are bolted solid metal disks the same as those used in artillery wood wheels. Wheels intended for commercial use must take wider tires and in order to do this, the opposing disks are separated by a ring piece of wood which is bolted between the disks at their outer edges. In these commercial wheels, the rivets uniting the two disks are replaced by fairly heavy bolts, giving the wheels a strong construction throughout.

Cullman Wheel Co.

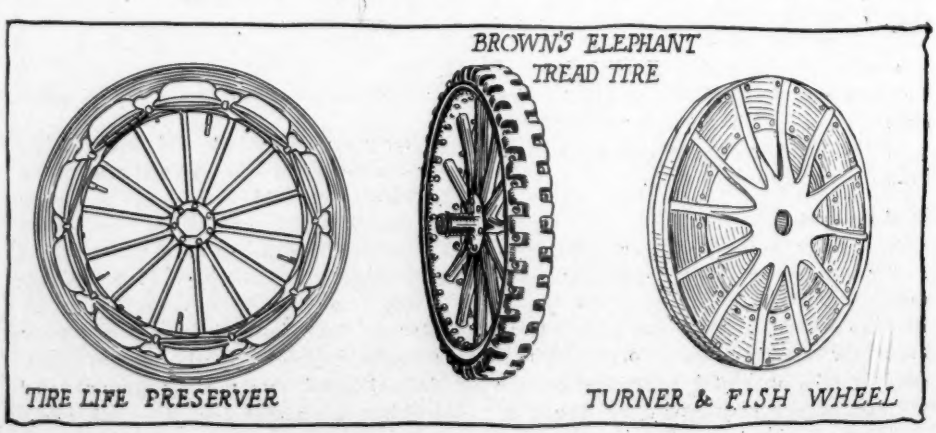
Cullman spur differentials and sprockets are shown by this company, which also exhibits Baldwin, Diamond and Whitney chains for which it is agent. Three sizes of the spur gear differential are made, 1 for runabouts, 2 for cars from 5 to 20 horsepower and 3 for heavy vehicles. The gear cases and covers are made of malleable iron. The two large spur gears and the pinions are made from steel and the pinions are case hardened. Six screws fasten the steel sprockets to an independent shoulder on the gearcase, so that they can be removed without disturbing the rest of the gear. The beveled driving gears are made of steel and hardened and fastened on the gearcase the same way as the sprockets. The pinions and axles differ from others in that they are formed in one part. The pinions are bored out to reduce weight, with the holes filled with oily cotton for lubrication purposes. By this method of construction the pinions do not run dry, for the oil has plenty of chance to get where it is needed. The feature of the gear is the oil-retaining shoulder, which is part of the gearcase and is cast all in one. It extends inward from about 5/16-inch on the No. 1 gear to ½-inch on the No. 3 gear, all around the case, thus preventing oil or grease from leaking through between the edge of the gearcase and the cover. The pinion in the differential gear is all in one piece, with nothing to work loose and oily cotton taking the place of the axle.

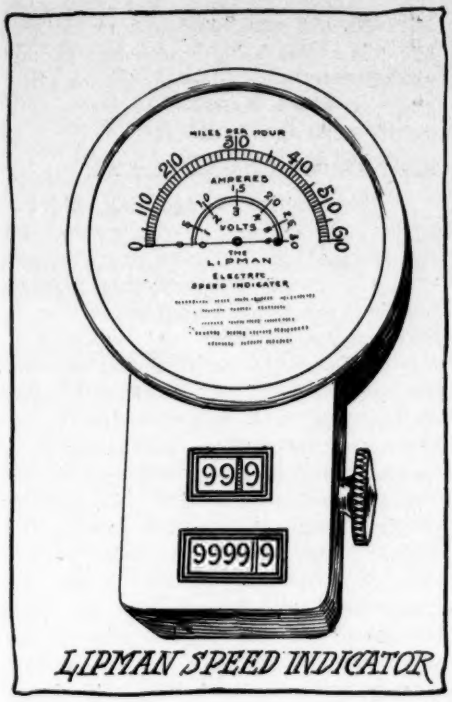
Pneumatic Tire Protector Co.

Life preservers is the name given to the pneumatic tire tread protectors made by this concern. The protectors take the form of a heavy canvas and rubber covering which encloses the entire tread of the tire and has ten lugs on either side which are integral with the tire fabric and rubber and which reach down to the rim of the wheel. On each of these lugs is a metal hook held in place by three copper rivets. When the protector is in position on the tire a 5-16-inch wire cable is passed around the hooks and has its ends secured by a turnbuckle. For mounting the protector on the tread the turnbuckle is loosened and when in place adjustments to the extent of 2 inches can be made by it. In some of the styles turnbuckles are not used for adjustment, a two-hole sleeve with set screw for each being used. The opposite ends of the cables are received in the holes and when drawn to any tension are held by set screws. This adjustment is unlimited in its action. The covers are made in sizes for 28 by 2½ up to 36 by 4½ and are provided with corrugated or plain treads. Besides serving as protectors against puncturing they are valuable for their anti-skidding qualities.

Duplex Coil Co.

Duplex spark coils in 1906 dress are considerably different from some used last season, in spite of the fact that the general principles underlying their construction remain unaltered. A double primary and secondary winding is still used and a double core is adopted. The new style of





LIPMAN SPEED INDICATOR

vibrator is of the compensating type and has a self-locking adjustment screw. Two energizing centers are used for attracting or magnetizing the vibrator, the latter being a central vibrating part which lies midway between the energizing tips and carries crosswise in it a flat spring piece, the ends of which are directly above the energizing centers. The adjustment screw is easily taken off, being secured in a metal plate which is in turn held to the coil case by a set screw. Single, double, triple, quad and six-vibrator coils are included in the present line. By its double winding and the consequently strong magnetic force of the coil, the maker claims that sticking of the vibrator is eliminated.

E. Y. White

This San Antonio man is showing a cushion frame for motor cycles. The post from the set of the back hub has an air cushion in the top part near the seat. The cushioning takes the form of one cylinder working within another, an air cushion resting between the cylinders.

Carl E. Lipman

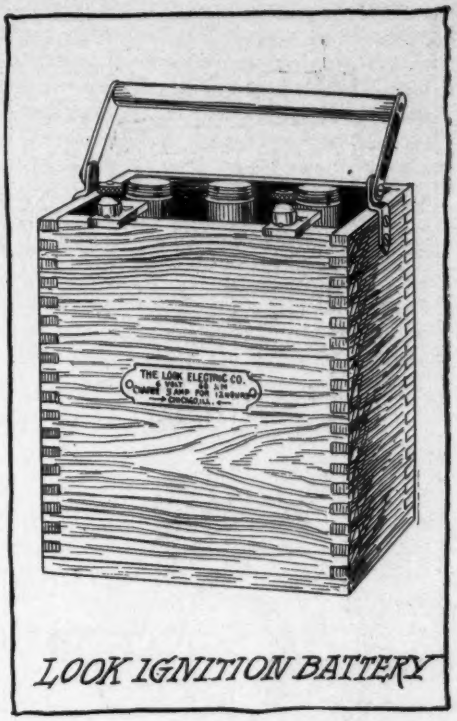
An electric speed indicator is one of the attractive features of this exhibit. It is a well-known fact that with small electric generators the voltage produced is directly proportional to the speed at which the generator revolves. Using this as a basis in his speed indicator, the maker has placed a small electric generator weighing less than a pound on the steering knuckle of the car and has it driven by a small wheel carried on the road wheels. On the dash of the machine is a semicircular dial reading in miles per hour up to 60 and within this are two smaller dials showing amperage and volts. The device is, in short, a voltmeter designed to read in miles per hour, and the mechanism is so delicate that a current of less than 1 volt is required for a full deflection of the needle. The only connection between the generator on the axle and the instrument on the dash is a heavily insulated wire for carrying the current. Besides this speed-indicating device a trip mileage registering to 100 and a 10,000 season mileage are attached. Both of these are operated from a flexible shaft from one of the road wheels of the machine. A finger wheel is used for returning the trip mileage to 0. There is also a 40-mile indicator for runabouts. Lipman pumps in all varieties are shown.

Bullard Automatic Wrench

Of the many useful tools of the motorist, the Bullard automatic wrench possesses peculiar merits, in that it is a combination monkey, pipe and ratchet wrench, being suitable for square or hexagonal nuts or pipings of any shape. It consists primarily of four parts: a handle piece, to the lower end of which is pivoted a hook-like jaw with serrations in the hook portion; a hammer-like jaw pivoted to the center of this hook-shaped one, and a coil spring normally exerting its tension so as to force the jaws together. One jaw has a serrated piece riveted in position, and on the other end is a curved portion which rests against a lug on the handle piece to give leverage.

John & Hensel & Co.

Hensel storage batteries are made for electric vehicle work and in smaller sizes for ignition purposes on gasoline engines. The vehicle battery, a ten-tray affair, has an amperage of 150 with a pressure of 2 volts per cell. Six different styles of sparking battery, each enclosed in an oak case, are manufactured. The 60-ampere-hour cell has a voltage of 6. Another

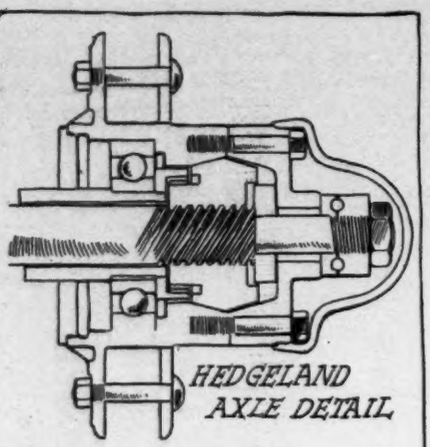


LOOK IGNITION BATTERY

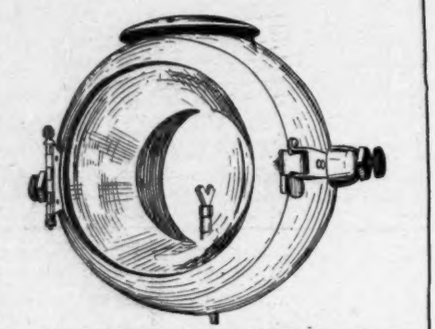
cell, with the same amperage, gives 4 volts. In addition to the regular terminals, which are carried on the end of the battery box, emergency terminals are fitted. These are nothing more or less than a copper rod with a loop at one end, to which is attached the battery wire, the other end of the rod passing between spring pieces on the binding post. The Hensel grid entirely encloses its active material. Primarily the grid is a rectangular frame work with its height approximately double its width. In this frame work are placed horizontal troughs with corrugated bottoms and side openings along the bottom between the corrugations. These troughs are filled with active material and built up one or another until the frame is filled, when they are all firmly secured in place. By this arrangement the active material cannot get out because of jars, and the electrolyte has an opportunity to reach it through the side openings between the corrugations. Rubber separators are employed in all sizes.

Look Electric Co.

Specialties of this concern are sparking batteries in 6-volt with a 60-ampere hour current, 4-volt with an 80-ampere hour current, and 8-volt sizes. In addition to these are batteries specially built for electrical machines. The sparking batteries are put up in wood boxes with dove-tailed corners. A combination metal and rubber handle of the swinging type is used. A cushioning of paper and parafine is placed all around the rubber cells to prevent breakage. The top is carefully sealed and in it are two or three vent holes. The terminals on top are mounted on lead strips which separate them from the sealing material and reduce the danger of corrosion. Positive and negative grids are 3/16-inch thick and are made from lead.



HEDGELAND AXLE DETAIL



PHARE CONTINENTAL LIGHT

Perforated rubber separators are fitted. In the 6-volt battery there are fifteen plates, nine negative and six positive. In the 4-volt there are ten plates, six negative and four positive, and in the 8-volt there are twenty plates, twelve negative and eight positive.

Universal Electric Storage Battery Co.

The Morrison storage battery, the exhibit of this concern, is made in sizes for automobile engine ignition, for electric vehicle propulsion and for heavy commercial electric machines. The twenty-four-cell battery for electric cars is in four units, six cells to the unit and has an amperage of 190 with a pressure of 2 volts per cell. For heavy truck use a 40-cell battery in the form of ten trays with four cells to each tray is designed. The sparking battery for gasoline engine use gives a current of 80 amperes with 6-volt pressure. In all of these batteries the positive plate is the most interesting part in that the active material is not pasted into the meshes of a sieve-like structure but is encased so it cannot be seen. The grid consists of several horizontal ladder-like constructions, placed on their backs, and are filled with the active material. Between each is placed a lining of cellulose and a perforated wood partition, so the active material is completely housed but is not in any way out of range of the electrolyte. The negative plate is not different from the ordinary type used. Perforated rubber separators are employed.

Automobile Supply Co.

Like all supply houses, the booth of this one is a maze of the various parts needed by the motorists. In the lamp line the general use of parabolen lens is conspicuous. Horns are in every variety, the musical Gabriel being much in evidence. The line of tire pumps is varied, including all styles. In the clothing department is an assortment of summer dusters, cloth, rubber and leather caps, winter fur garments and robes and other necessaries. Goggles, commutators, wrenches, spark plugs, ammeters, dash clocks, oil guns, wire terminals, gasoline funnels, acetylene generators, lap robes, tire covers and tires are among the numerous other parts shown.

International Non-Explosive Tank Co.

In this exhibit is what is termed a non-explosive gasoline tank. The tank itself is of ordinary construction, but in the filling cap is inserted a copper tube with circles of perforations throughout its length, the tube being in length equal to the depth of the tank. Should gas in this tube become ignited, the flame is confined to it, because the perforations are sufficiently small to prohibit it spreading to the tank. In the top of this tube is a pressure valve, so designed that should the gas within the tube commence burning, it will generate sufficient pressure to raise the valve. These non-explosive tubes are also shown in different sizes for gasoline bottles, which are intended for household uses, and are supposed to render the gasoline non-explosive even though the bottle be filled with fumes. In cases where bottles are used, the non-explosive tube is made of German silver. In order to further insure non-explosive qualities in car tanks the entrance of the gasoline pipe from the carbureter is protected by a small spiral-threaded valve, the thread being sufficiently small to prevent the passage of flames through it, yet large enough not to restrict the flow of gasoline.

Culver Novelty Co.

Young's rotary carbureter, the product of this concern, is of the floatless type, the needle valve being also a check valve to completely stop the flow of gasoline. Both throttle and needle valve are controlled by the same lever and work in harmony. When the throttle is opened the needle valve is raised, admitting more gasoline. With the throttle closed the needle valve is close shut, prohibiting the entry of gasoline. With each increase of the throttle there is a corresponding increase in the flow of the liquid. A disk attachment which, raised and lowered by the inrushing air, also exercises a control on the needle valve, opening it with fast gusts of air. For mixing purposes a horizontal cylindrical mixing chamber is used. In it are four rotary fan wheels which revolve on ball bearings and aid when rotating in mixing the gasoline and air.

H. S. Michaels Co.

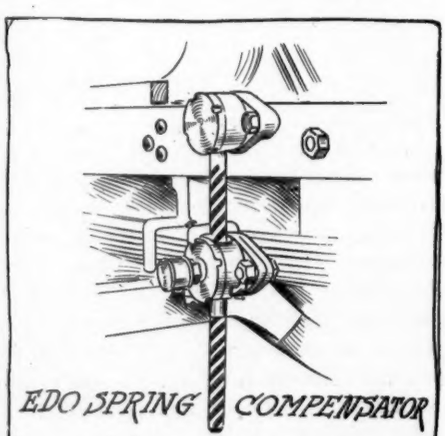
This stand is particularly interesting to motorists with touring inclinations, for Mr. Michaels has something new in the map line, his routes being made clear through having every turn illustrated by a photograph on which is marked an arrow showing the right turn in the road.

Boyer-Radford & Gordon Tank Co.

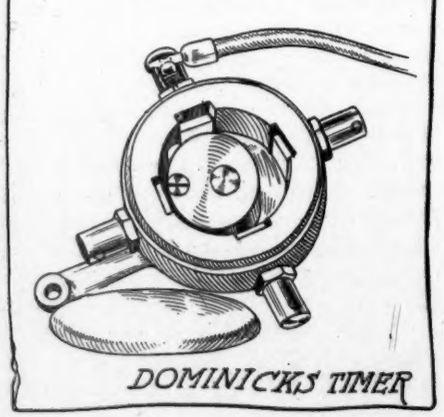
In this gasoline storage tank, which is adapted for garage and repair shop uses, the storage tank is made of galvanized steel with the parts riveted and soldered together, the whole being designed to be buried in the ground or put in out of the way places, and is made evaporation proof. The tank is filled by means of a heavy metal filling tube rising vertically from the top of the tank to the garage floor. On this filling tube is an air top lock cap. Tanks are made with a capacity ranging from 63 to 170 gallons, for ordinary use, and others with capacities of from 225 to 500 gallons for larger purposes. The latter are made throughout from boiler steel. The pumping arrangement is a standard plunger pump enclosed in a cubical box set up on four feet. The pump is operated by crank on a horizontal shaft, on one end of which is a disk, to the circumference of which is connected the pump plunger. On the top of the device is a registering dial, by the simple turning of which it is possible to measure accurately, pint, quart, gallon or any other amount desired. One revolution of the handle pumps 1 quart.

Skinner & Skinner

The Skinner compound tire pump works on the reciprocating piston scheme, but is



EDO SPRING COMPENSATOR



DOMINICKS TIMER

compounded so pressure is generated on both the up and down strokes. On the bottom of the pump is a pressure gauge showing the inflation of the tire. The pump is finished throughout with brass, has neither gears, check valves, nor wires to get out of order and is operated by a double cross handle on the top of the plunger. The pump consists of an outer tube within which are two movable piston parts, one to which the handle is attached and the other working within this.

Eugene Arnstein

Besides a regular line such as handled by all jobbers, this supply house has products of its own manufacture. These are automobile cement for patching work; aluminum enamel for cylinder painting put up in cans with capacities from ¼ pint to one gallon; air drying and baking enamels in all colors; tire renovator, a liquid applied by brush to the outer surface of the tire, which gives it an appearance of a new tire, ¼ of a pint being required for a 30 by 3-inch tire; and Century oil. The regular jobber line includes such parts as a dozen styles of wrenches, tire sleeves, carbureters, gauntlets, jacks, horns, lamps, tire pumps, spark plugs, chains and many other supply parts.

Gaulois Tire Co.

Gaulois tires made in France are of the combination leather and fabric type and consist of 85 per cent rubber. In their construction a heavy rubber layer is on the outside. Within this are three alternate layers of rubber and fabric; next comes a heavy rubber layer and inside of all are seven alternate plys of rubber and fabric. The fabric used is a heavy grade of Egyptian linen. Corrugated flat treads are shown in many sizes and the special racing tire with a narrow flat tread is included. This tread differs from the others in that a leather covering ½ inch thick covers the tread part and encloses half the sides of the tire. These tires are made in metric sizes corresponding with American makes, varying in sizes from 26 by 2½ to 42 by 5 inches.

William Dominick

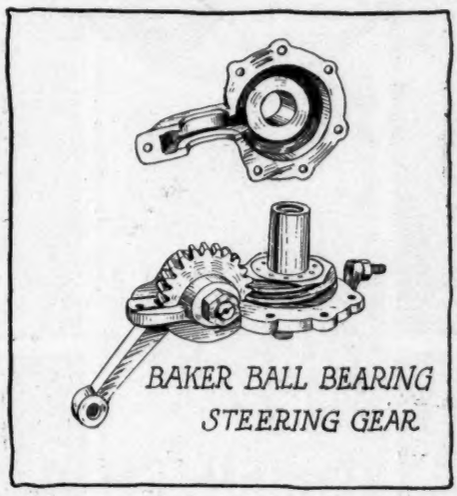
This timer follows conventional lines in having the four stationary terminals arranged at quarters of the case and has the central electrodes in the form of an eccentric, secured to the central shaft. This shaft is case hardened and runs in bronze bearings. The four contact balls imbedded in the fiber casing are made of tool steel. The movable contact is a short pin with a rounded head carried in the eccentric and is so designed that the timer may be run in either direction with equal facility.

Franco-American Automobile Supply Co.

This house is a western branch of Leon Rubay, the New York supply house. In its exhibit, the Edo shock absorber, for use on automobiles, is conspicuous. This absorber consists of a vertical spiral shredded rod, with a large ball ending on top. This is contained in a socket secured to the side of the frame piece. The rod passes through a threaded socket attached to the side of the spring or carried on the axle.

Webster Mfg. Co.

The Hedgeland axle, exhibited for the first time at the 1905 Chicago show, is of much the same design as last season with, of course, a few alterations consequent upon a year's experimenting with it. This axle takes the place of a differential and divided axle, using, as it does, a solid steel axle extending from one road wheel to the other. In spite of this solid construction it contains all the features common to a differential, permitting one wheel to travel faster than the other in turning a corner. Within each road wheel hub is an internal chamber somewhat resembling a hollow hub extension with the circumference of this space in two sloping parts like the two ridges of a roof. Within this space is a clutch nut working on a thread on the axle. When driving ahead the revolution of the axle carries the nut to the inner side of the hollow space and against the wheel hub so the friction between the nut and the hub drives the wheel. As soon as the wheel is called upon to travel faster than the axle, as in case of the outer wheel in turning a corner, the wheel turns the nut back on the thread until it rides in the center of the hub space, touching neither at the outer nor inner side. In reversing, the axle revolution carries the nut to the outer side of the space so the nut contacts with the hub part of the wheel at that side. It is thus by this nut traveling to the inside to drive ahead, to the outside for reversing, and in the middle when the wheel is running idly, that the differential action is accomplished.



Limousine Carriage Mfg. Co.

Finished just in time for the show, this Chicago concern has a limousine top which enables the owner of one to really possess two rigs. It is a combination affair and removable, the top coming off and allowing an extra seat and door to be attached, converting the rig into a touring car. On the tops made by this concern the Beecher sliding bow socket is used. This is fitted in connection with side joints, the knuckle in the joint being so set that as the top falls it draws out the slide. It also allows of even spacing of the bows and at the same time falling clear of the body. When the extension top is folded down the Beecher bow socket allows the center bows to be extended and clear the back, giving a clear view backward for the driver and forming a dust shield.

Whiteley Steel Co.

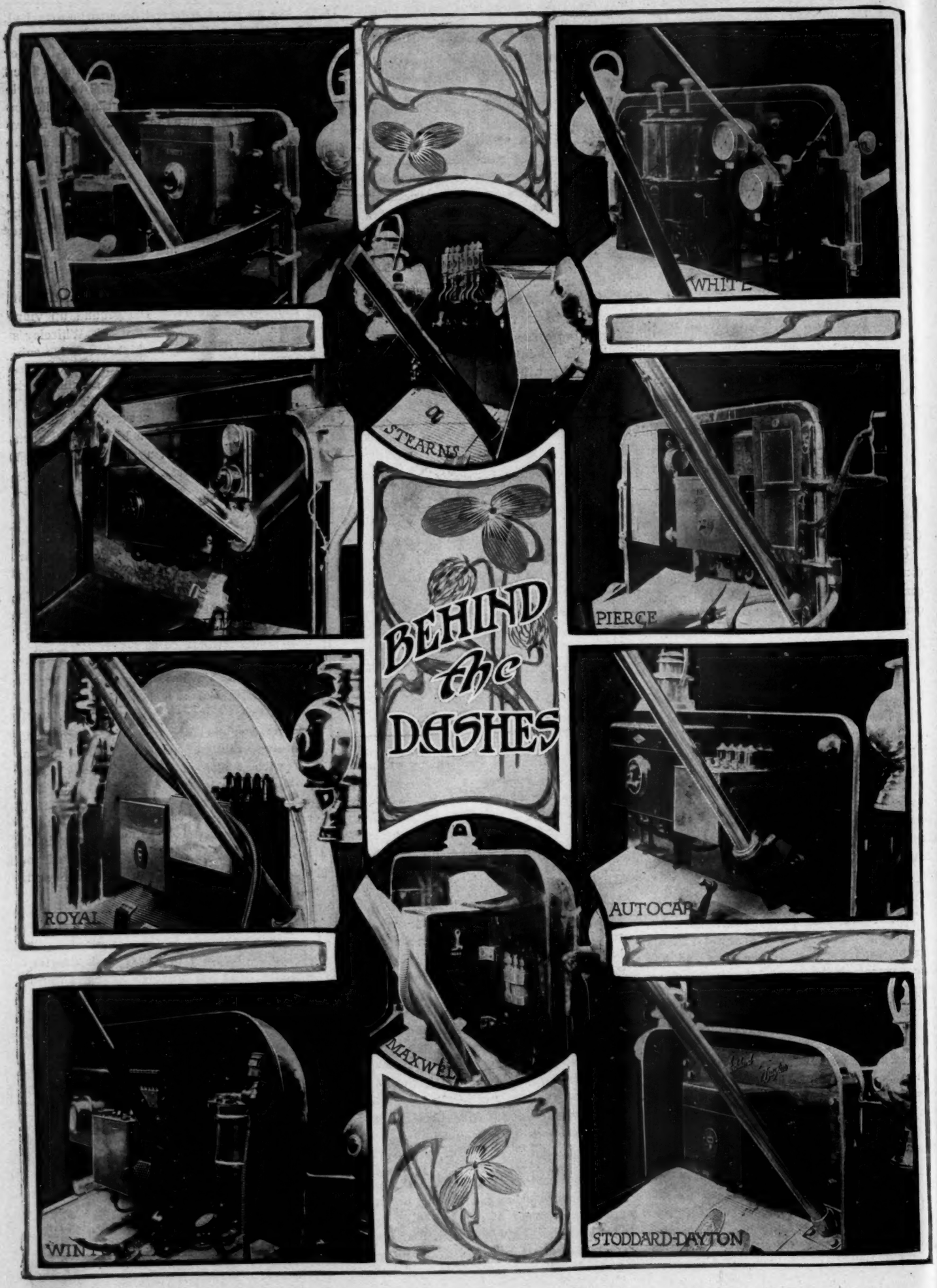
Those interested in the construction of the automobile from the ground up view with interest the exhibit of Whiteley's crown steel castings, which are made substantially true to pattern in the form required, leaving only sufficient surplus stock for machining and finished with a smooth surface. The metal possesses a density which is susceptible to a high polish much resembling nickelplating. It is also tough and difficult to break by bending or twisting.

Beckley-Ralston Co.

Everything in the way of accessories, sundries and supplies for motor cars, motor cycles and motor boats is shown on this stand, the exhibit including Maxwell tire tongs, Burke climber and non-skidding device, all leading makes of chains, Auto-Coil and Splitdorf coils, Never-Miss, Soot-Proof, Sta-Rite and other plugs, Ever-Ready Columbia batteries, line of horns, B & R, E & J and Chicago lamps and generators, Warner speedometer, B. & R. meters and clocks, pumps, jacks, goggles, clothing, oils and polishes. Two chains on each wheel are used on the Burke climber, these chains connecting with the clip in such a manner that they are held clear from the spokes and rim of the wheel. They fit the tire so that when the weight is put on the clip the tire is allowed to spread. Each clip is half round and smooth, so the tire is not injured.

Baker Gear Co.

Easy adjustment is the advanced merit of the Baker steering gear and steering columns. The steering gear is of the worm and pinion type, a hardened steel worm being carried on the lower end of the steering column and meshing with a hardened pinion, to the axis of which is attached the steering arm. Both are enclosed in a malleable iron case. Two circles of ball bearings, one above and another beneath the worm part, are used. Lost motion can be taken up by a nut adjusted at the bottom of the column. By using a wheel instead of a sector, when one-fourth of the wheel is worn, any one of the three remaining fourths can be used. The steering column is a brass bearing within which is a sleeve for connection with the throttle.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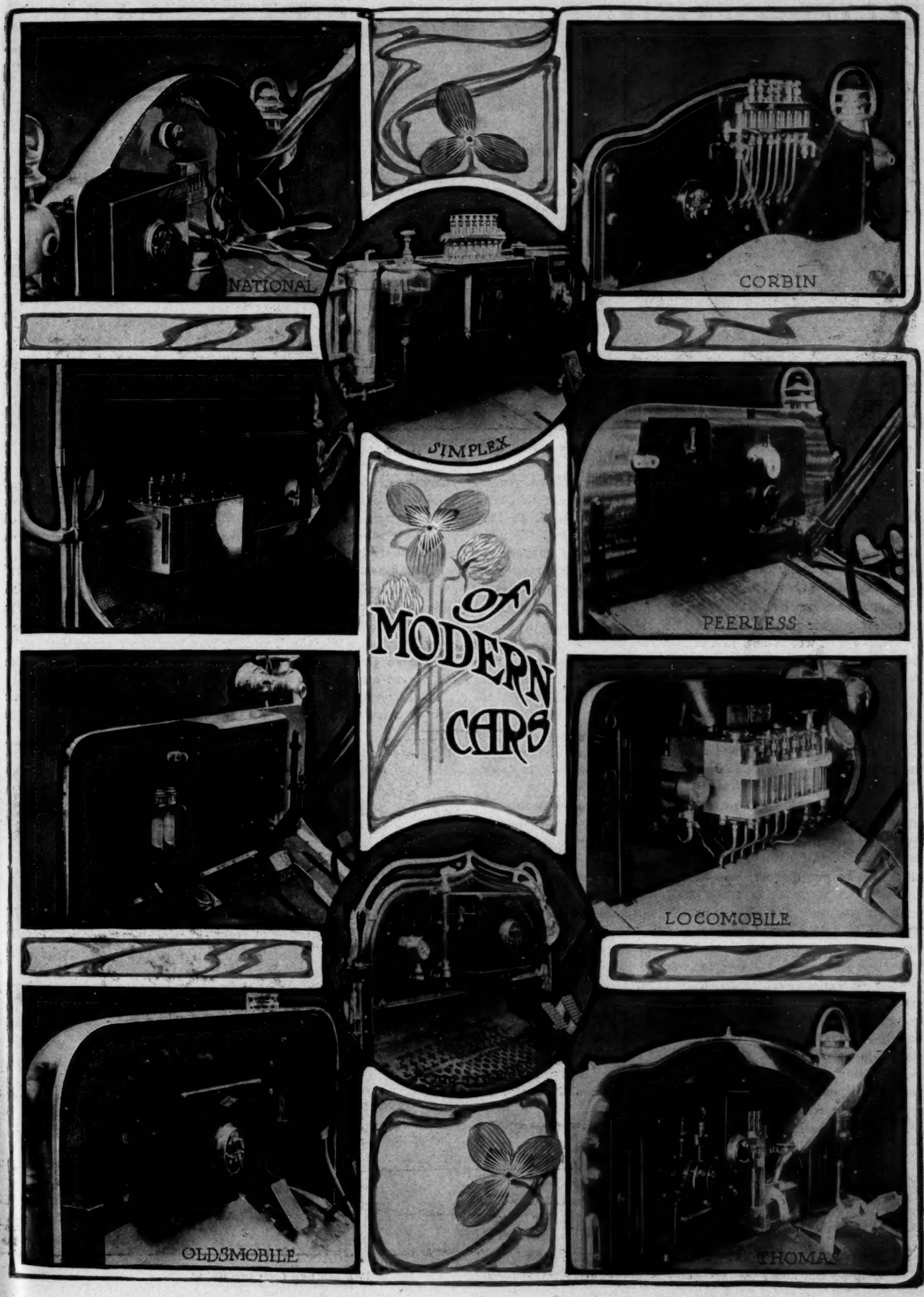
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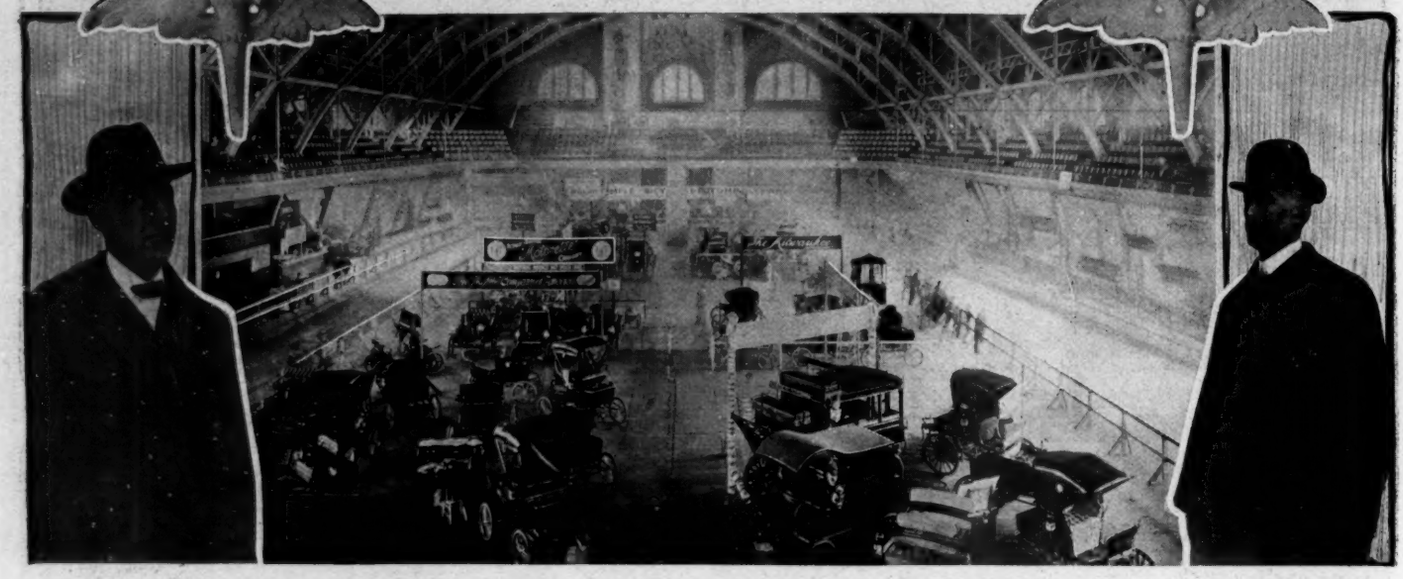
THE SHOW SAM MILES MADE



S. A. MILES — FIRST SHOW IN THE COLISEUM, WHICH OPENED IN MARCH, 1901 — L. L. FEST

"THIS makes my sixth show," said Samuel A. Miles, general manager of the National Association of Automobile Manufacturers, Saturday night, as he and his assistant, L. L. Fest, stood in the press stand at the Coliseum and watched the great crowds surge up one aisle, sweep down another and eddy up the stairs to the balcony above. "I guess I am what you might call a veteran in the show business. It's about time I tried something else, but somehow I can't break away. There's such a satisfaction seeing your plans work out to a nicety, to hustle like mad for weeks and weeks and in the last few days have so much to do that you wonder how you can begin to do half of it, and then see everything ready for business at the appointed hour, just as it is now—exhibits all in place, the decorations and staff work all done and even the ones who have been hollering for more space placated. Then you can stand up here as I am doing and look the world in the face and not be ashamed of your handiwork. It's as the breath of life to me and I guess Fest feels the same way about it, don't you, Fest?"

Five of these shows—the last five, including this one—have been run under the auspices of the N. A. A. M., but Miss Chicago can go farther back to trace her introduction to the automobile show. Of course, the one Miles personally promoted in 1900 can be put down as the first real exhibition, but previous to that there were two or three affairs that cannot be overlooked by a man writing the history of Chicago shows. The first time the public was allowed to look upon the automobile was at the time of the fall festival of 1898 when some enterprising promoters put on an indoor bicycle meet at Tattersalls' and to add novelty to the occasion included an automobile exhibition, which consisted of half a dozen electric rigs, which gravely paraded around the inside of the track after a section of the speedway had been removed in order to let the rigs in. A favored few were allowed to ride in these automobiles and the public really got familiar enough with them to style them autos, which since then has given way to the better sounding automobile, motor car or just plain car.

A few months later on—in January, 1899—N. H. Van Sicklen conducted the bicycle show in the Edson Keith building at the corner of Wabash avenue and Monroe street, at which time he formally introduced the automobile to Chicagoans. It wasn't much of a show compared with the present grand Milesian spectacle—just a section of the fourth floor of the building jammed with bicycles set aside for the horseless carriage. Of course, everyone was crazy to ride in the vehicles exhibited and many a Chicagoan can trace his motoring career back to this time when he was lucky enough to get one of the tickets which entitled him to whirl around that little floor at what must have been all of 3 and possibly 4 miles an hour.

The American Electric Vehicle Co. had a light $1,000 road wagon, electrically propelled, and the Fischer Equipment Co. Woods electric stanhope, runabout and hansom. In the same show the Oakman Motor Vehicle Co. displayed a two-cylinder, two-cycle engine, while the Truscott launch was on exhibition. The Goodrich, Goodyear and Hartford tires, all now familiar names in the motoring world, were numbered among the exhibitors.

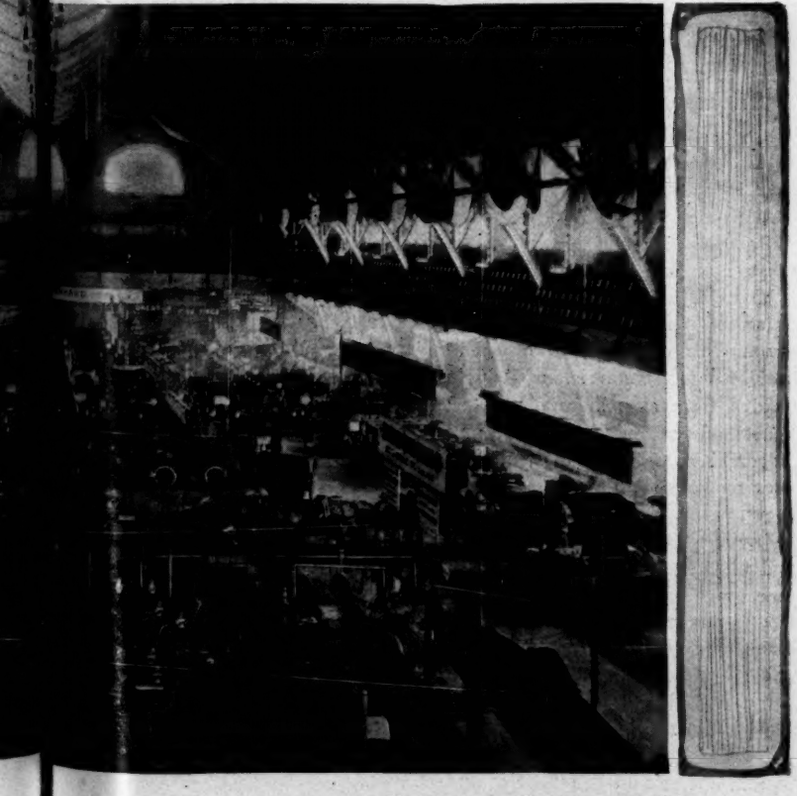
In between the Van Sicklen affair and Miles' first attempt came the Washington Park racetrack affair. The Chicago Inter Ocean

THE FOURTH CHICAGO SHOW

LAST YEAR'S EXHIBITION FIFTH IN CHICAGO SERIES SCENE LOOKING NORTH

promoted a combination of show and race meet which was poorly managed in the first place and on too elaborate a scale for the condition of the industry in the second place. Under the grand stand were the booths, among the exhibitors being the Woods Motor Vehicle Co., the American Bicycle Co., Baldwin Chain Co., Buffalo Gasoline Motor Co., Canada Brothers Auto-Quadricycle Co., and Carse Brothers.

The first really, truly national automobile show, promoted under the auspices of MOTOR AGE and Samuel A. Miles, opened in the Coliseum March 23, 1901. It was a strenuous affair, in that the weather man was particularly spiteful that week, while the fact that the mayoralty election was going full tilt shut the show off from the publicity needed in the daily newspapers. Manager Miles had sent out 20,000 invitations, though, and the result was that the big building was comfortably packed on the first night, despite the weather. For the time it was a grand spectacle, but mighty crude as compared with the present one. Miles only had a handful of exhibitors—not enough to fill all his space, so he devised the unique scheme of putting in a track for demonstrating purposes. It proved to be the real feature, though, and the rigs were kept grinding away for all the world like a 6-day bicycle race. As an added attraction a home trainer was rigged up in the north end of the building on which two Mobiles puffed and snorted in a play race, their progress being shown by means of a huge dial.



HELD IN THE COLISEUM IN 1904

In 1902 the Chicago show was run from March 1 to 8 and was a three-handed affair, in that the affair was conducted under the auspices of the N. A. A. M., the Chicago Automobile Club and S. A. Miles. As was to be expected, it was more of a show than the initial effort, MOTOR AGE reporting that thirty-six makes of automobiles were represented and 113 vehicles shown. Forty-nine were shown by the twenty-two makers of gasoline rigs, thirty-three by the seven makers of steam vehicles, while the seven manufacturers of electrics displayed thirty-one machines. It was at this show that the American Automobile Association was born, the organization starting with eight clubs—the New Jersey Automobile Club, of Newark, N. J.; the Long Island Automobile Club, of Brooklyn; Chicago Automobile Club, Automobile Club of America, Automobile Club of Philadelphia, Grand Rapids Automobile Club, Automobile Club of Rhode Island, and Automobile Club of Utica.

This same alliance of the three was continued in 1903, when Chicago surpassed Madison Square garden by having seventy-two constructionally different styles of gasoline cars, ten of electric and five of steam, as compared with sixty, eight and eleven respectively at New York.

The National Association of Automobile Manufacturers took matters in its own hands in 1904, turning over the management of the affair, however, exclusively to Manager Miles and his able assistant, L. L. Fest. In this there were 155 exhibitors, as compared with 260 this year. The weather, as usual, was decidedly wintry, but in spite of this the show was a success.

The show of 1905 is still fresh in the minds of the public, for it was greatest of all, the list showing a total of 277 exhibitors, of which seventy were manufacturers of automobiles and the remainder parts and accessories. Again the weather man was mean, heavy snows blocking the streets all during the show.

The Far West as a Selling Field

EVER since my first transcontinental automobile trip have I been impressed with the great possibilities opened up to motor cars in the middle west and far west. This, my third trip across the country in a motor car, has taught me many things and brought directly to my notice conditions about which I had never even read.

There is the rural free delivery business, and with the thousand of carriers it certainly is a business that should be given close attention by manufacturers of automobiles. These rural free delivery carriers must necessarily drive horses that are perfectly gentle, and that, nine times out of ten, means a plug. With such a nag it takes from 7 to 12 hours to cover a 20 to 40-mile route, according to the number of stops, condition of the roads, etc., which the average rural free delivery carrier encounters on his trips.

With an automobile he could do this in a quarter the time and cover a much longer route if necessary. The mail matter carried is comparatively light and the simplest little runabout would answer the purpose. Yet we see no manufacturer advertising automobiles for this purpose—why, I don't know. Many makers are building trucks, some are giving special attention to light delivery wagons, yet the rural free delivery men must either use one of the standard runabouts and have his blacksmith alter it to fit the requirements or cling to his horse and wagon.

In Portland I was more than surprised at the number of automobiles for hire on the streets. There were all kinds and conditions of cars, from the handsome Pierce Great Arrow, which is kept looking as bright and wholesome as the day it landed in Portland, to little runabouts, whose cramped quarters and dingy appearance causes one to wonder who would think of hiring one; yet one and all did a good business this summer. The drivers, as in case of the aforementioned Pierce, sometimes owned their cars outright, sometimes worked on a weekly salary and sometimes on a percentage. Many bright young fellows were running cars and getting half of what they took in, and incidentally standing half the expense of upkeep. This seemed to be a very fair arangement, as a good, popular driver frequently made $75 a week as his share and sometimes more.

Another chance to make good money out of automobiles is running a stage line, where the distance to be traveled and the time it would take a team of horses to make the trip would make it an object to run automobiles. Several United States mail routes and stage lines are bid in each year. The carrying of the mail for the government would bring in enough revenue to pay for keeping up the line and passenger service would all be velvet.

In Nevada, California, Oregon, Idaho, Wyoming, Arizona, Utah and New Mexico there are innumerable openings and also innumerable stage lines where automobiles are operated for this purpose. W. C. Vaughan, formerly of Richmond, Ind., now of Pasadena, Cal., operates three large, old-fashioned automobiles on a stage line that is making him good money. His traveling east from Los Angeles to Winslow, Ariz., in the Reo Mountaineer, was to admit of his studying conditions with the object in view of spreading himself in the livery line.

The Santa Fe railroad runs a train once a day from Williams, Ariz., to the Grand Canyon of the Colorado, 60 miles north. Flagstaff and Winslow are both within the same distance of the Grand Canyon and the possibilities for automobile stage lines from these two points to the canyon are excellent. Babbitt Brothers, of Flagstaff, who operate the livery stable in that town, are looking into the automobile business and may start such a stage route.

The principal trouble with new automobile stage lines, especially where the stockholders are new at the business, is the purchasing of too heavy vehicles. Sixteen horsepower five-passenger cars are right for stages. The cost of upkeep is small, the engine situated in the middle of the frame causes the car to ride easy, while the lightness of the car makes it comparatively easy to get out of mud or other difficulties.

One of the chief objections to automobile traveling in the west is the low clearance. Western trails—roads are scarce—are usually composed of two deep ruts, with a high ridge between. No one drives a single horse and everyone drives in the same track until the ruts are worn to such a depth that a new trail is desirable. When these ruts are filled with sand, dust or snow it is an easy matter to get hung up, and a hard feat to get free. There is some fording to do, and for that reason carbureters and wiring should be as high as possible.

All automobiles built for automobile stage lines in the west—and, unless I am greatly mistaken, there will be hundreds of such lines in the near future—should be equipped with a hinged platform in the rear, on which baggage can be strapped. It is no unheard of thing for an automobile stage line in the vicinity of the Nevada gold fields to charge passengers 50 cents a mile for transportation, and passengers pay it rather than buy or hire teams at the livery where, while prices are a shade lower, the time consumed is five times as great, and time is money in the gold fields.

Manufacturers underestimate the importance of Los Angeles as an automobile field. This city is far more important as an automobile center than San Francisco, and from the present indications of growth Los Angeles will soon surpass the famous Golden Gate city in number of inhabitants. Today, I think, it boasts of nearly if not twice as many automobilists as does the larger city. Los Angeles, a city of constant summer, is an all-year motoring center. As such it seems to me as though manufacturers should ship their new models west just as soon as completed—even before New York and Chicago receive the new models. It means thousands of dollars to the agent if his new models are received before his competitors, yet manufacturers ship machines to some northern and eastern cities, where they have to be stored for months before the roads will admit of their use by the men who make early purchases.

I visited a number of automobile stores in San Francisco and Los Angeles and all seem able

to sell more machines than they can get. Shettler has simply loaded the entire Pacific coast with Reos, yet he seldom is able to keep a sample for more than a few days. Smith & Anthony, the new agents for the Elmore in Los Angeles, have sold all the machines they can get, and the Elmore was hardly known before Smith's arrival in town, less than a year ago. White steamers are thick all along the coast and incidentally it is a White that holds the San Francisco-Los Angeles record, 500 miles over several steep mountains, in less than 24—about 21 hours, I think. The Tourist, a machine manufactured in Los Angeles, has been sold about as fast as it could be manufactured this year, while the Thomas, Pope-Toledo, Peerless, Packard, Premier, Rambler, Franklin, Wayne, Stoddard- Dayton, Olds and a few others are selling fast, according to the reports heard along the road.

The western people are great lovers of sport and despite the time-worn statement that racing doesn't pay, it certainly makes an impression here. Endurance runs, hill-climbing contests, transcontinental work, road races and track racing are what sell cars in the west, and the press is more than willing to help all such contests. I attended a hill-climbing contest on Thanksgiving day at Riverside. The affair was the worst managed I have ever witnessed and I had as my associates that day the automobile editors of the Los Angeles Times and Los Angeles Examiner. The papers came out the next day and skipped over the fierce management, saying that while it might have been handled better, the management deserved all the praise possible for his sportsmanship in promoting a hill-climb. Incidentally, the cars that got to the top of that hill first sold for weeks afterwards.

One reason why manufacturers should ship their earliest models to Los Angeles is the presence in that city all winter of prominent eastern motorists who are out on the coast to escape the severe weather of the east. A large percentage of these people bring their automobiles with them, and if they see the new models here they are ready to buy when they return, or may even telegraph their orders in to their own home dealer.

At San Francisco there is an excellent opportunity for some capitalist to enter an automobile business already established and whose machine has proved by hard tests on the road during the past 2 years to be built right. It is the Sunset, a two-cycle two-cylinder runabout, very powerful and very fast, which retails at $500. At the present time the company is building in too small quantities to make a success of the business, but with enough capital to put up a modern automobile factory and the output increased from a few hundred to a few thousand, the Sunset would certainly be a factor in the field, for it gives satisfaction.

Altogether, the western field offers such opportunities that it would pay the average manufacturer to take a month off, ship a car to San Francisco, and tour down to Los Angeles, or possibly up to Portland, and see things as they really are on the Pacific in the winter months.—PERCY F. MEGARGEL.

We do not see any reason why the big automobile-absorbing capacity, so to speak, of the western section of the country should not continue to increase proportionately in the future as it has done in the past few years. As you know, we are pioneer builders of automobiles, and from the very first our cars found a very ready market in the middle and far west, and we believe that the western section of the country has bought automobiles as readily as the eastern section, although it is very noticeable that the demand for touring cars of the best quality unquestionably has been greater in the east than in the west. Present indications are such as to prove that this is no longer true. One automobilist from one of the western states told the writer at the New York show that the interest in a high quality car was greater than ever before. "We now want the very best we can get," said this automobilist. "We have the money to pay for the highest grade of touring cars and are spending it, and by 'we' I mean everyone of means in the western section." This man came from a small town in the middle west, where considerable money has been made, and I think what is true of this city is true of hundreds of others. One of our western agents at the New York show placed an order for twenty-five cars for delivery in 1907, and I think this will indicate as well as anything else the demand for automobiles in the west, not merely for automobiles of moderate price, but of the most expensive kind.—J. A. KINGMAN, Locomobile Co. of America.

In describing the good points of the light touring cars at the Chicago automobile show, it will be greatly appreciated by your western readers if you will make special mention of any cars adapted to our mountainous country, with its rough roads, always high centered either with rocks, sage brush, or from the water from rains washing down in the wheel tracks. These obstacles necessitate a car with high wheels and lots of clearance and with the sprocket well to one side without a sprocket housing, so one will be able to back off from high centers should he accidentally run onto one instead of having to jack the car up, as Megargel has. A maximum speed of not over 15 or 20 miles an hour will give better hill-climbing cars and is about all the roads are adapted for at present.—HOMER A. FRANCE, Rawlins, Wyo.

I believe the future of the automobile in the western part of the United States is only limited to the advancement of the good roads movement and the continued present prosperity of the country. It is true it is not as thickly peopled as the east, but I believe there will be more automobiles per capita than there are in the east, due to the greater advantages obtainable if road conditions are such that they can be used.

I have particularly in mind the light, low-priced cars, because they are the absolute future of the business for a practical purpose, and particularly for the farmer. The passage of the bill before congress to remove the excise tax now on wood alcohol would greatly encourage the use of automobiles in the west, because the farmer could make his own fuel, and the operation of an automobile would be very inexpensive—much less expensive than the use of the horse. It would be costing him nothing while standing idle, and when in use its fuel would cost him very little.

The Pacific coast is a particularly fertile territory, due to the favorable climatic conditions. I believe that is the ripest field of all, and especially now with the prosperous conditions existing there and the influx of people to that part of the country. In conclusion, however, I must say the cars must be made light,

reliable, economical of maintenance and inexpensive as to original cost to make a large and permanent demand.—JAMES COUZENS, Secretary Ford Motor Co.

Not many years ago the real automobile interest in America was confined to the eastern states. Now and then a desultory order came to the automobile manufacturers from western points, but these were so few in number that the trade generally considered its time wasted in any campaign that sought to arouse western interests. That a rapid and complete change has taken place is evident from our own order books. The west has become thoroughly alive to the advantages accruing to the owner of a good automobile and the western trade has become quite as valuable as that of the east. Not only that, either, but from personal observations made on the Winton transcontinental trip last fall, it is evident to me that western buyers are fully as discriminating as those in the east, and not only know what constitutes a good automobile, but insist upon having it.—CHARLES B. SHANKS, Sales Manager, Winton Motor Carriage Co.

The trade conditions in the west at the present time are considered about 50 per cent better than ever before. Dealers who figured that the trade would slump a bit this coming year have changed their minds and now believe that all dealers will make good money this coming season. Incidentally there is a very healthy trade developing in the electric line, probably more so than in the gasoline. The electrics, though, are largely used in the cities and mostly purchased by men who already own touring cars, showing that those who can afford it will have a stable of cars for all purposes. In every section the automobile business is increasing wonderfully. The farmers have been converted and are buying largely in the second-hand market. The west is going to be just as broad a field as it was in the bicycle days. Its possibilities are unlimited, and I think that when the east is fully supplied the manufacturers will have plenty to do filling the orders of the west. In the city of Denver the mayor has established a fund of $10,000 providing the motorists will subscribe a similar amount for a road up the Platte canyon, about 15 miles. This may be extended to Palm lake, which is about 35 miles further. From here to Colorado Springs, 25 miles, the Colorado Springs people will put in one of the finest roads in the country. In California the good roads movement is particularly marked and touring there is on the boom. —G. A. WAHLGREEN, Motor Field, Denver.

The writer made a trip to the Pacific coast a few months ago and the orders taken at that time, accompanied by deposits, were very satisfactory; in fact, beyond expectations. We consider the west nearly as good a field for our car as the east. The western people are waking up to the realization that it takes a good car for their rough and hilly roads and that the best is none too good. Our entire product was disposed of 2 months ago and, what is most satisfactory to us, nearly all of the agents have sold the cars they have ordered. We have been compelled to move our entire season forward just 2 months; in other words, we are shipping cars in January and February which otherwise would have gone into March and April, and we have been able through our policy to give the agents a continuous season. We shall not be able to make enough Stevens-Duryea cars to suply the demand.—C. C. HILDEBRAND, Sales Manager, J. Stevens Arms & Tool Co.

The coast states are busy with their good road associations, and several other states have taken steps towards the improvement of their highways, and improved highways in every case mean more automobiles in that section. The encouragement of the road improvement work in the western states means the encouragement of the use of motor cars. Some day there will be a good road from New York to San Francisco, and long distance touring will be a popular diversion. Under the present conditions a transcontinental trip is made by an automobile under the most serious of obstructions the moment you go west of the Mississippi river, and even at that 35 to 40 days' time is consumed. Transcontinental runs have awakened much interest in the automobile trade throughout states and territories where their introduction through ordinary means would be very slow. Inquiries are being received for machines from western towns which are 500 miles from the railroad. The future of the automobile, both as a pleasure and commercial vehicle, is bright indeed in this western country, since both types of machines, both pleasure and commercial, have their utility value where the distances are so great. The policy of the American manufacturers is to build machines for any kind of American road conditions, and make a machine which every year can be run over the poor roads of the western states at a moderate expense and with maximum reliability. Even now it has become a proposition where a man who finds it necessary to cover a few or many miles per day that he cannot afford not to own an automobile.—R. D. CHAPIN, Sales Manager, Olds Motor Works.

The west is great in all things and it will be great as an automobile market. Indeed, it is already a good field and I believe this fact is fully recognized by all the leading automobile manufacturers. The coast has for some years been a first-class market. Chicago has long been a good market, but in 1906 the trade there will be better than ever before. The great middle west as a whole has been a little slow in taking up the automobile, but it is now thoroughly alive and the demand for good motor cars seems to be general throughout the United States. The market for automobiles will not be determined by geographical location as much as by road conditions and the wealth of the inhabitants.—H. H. FRANKLIN, H. H. Franklin Mfg. Co.

We believe the western market today to be fully as important as the eastern and that it will be only a short time before it will surpass the east in this respect. The center of population of the country is moving westward at a surprising rate, but

the principal reason for our belief that the west will be by far the larger field is because the villages and farming communities of the east are conservative, slow and backward as compared with similar communities of the west. The eastern farmer works his land much as his great-grandfather did before him, while the westerner uses the latest machinery and most modern methods and is, therefore, the more likely purchaser—not for this reason alone, but also because of his greater prosperity. The day is not far distant when nearly every well-to-do farmer in the west will have his own car, and when the American farmer begins to buy he stirs the country from one end to the other. The field is so immense we cannot even picture it in our wildest imaginations, but of one thing we may be sure—there's room enough for all of us, both east and west.—G. V. ROGERS, Secretary, Mitchell Motor Car Co.

The possibilities of expansion in the automobile business are largely the possibilities of the western and northwestern states of this country. Three years ago it was hard to create any special interest in automobiles in this section. The possible buyers were very skeptical and the road conditions were so vile it scarcely seemed as if an automobile could last if driven for a whole season through some sections. Today road conditions are somewhat better, but the large increase in the use of motor cars in the west is due to the proving by the makers that the machines could be made to successfully negotiate even very bad roads, and could keep doing so week after week and month after month.

The prosperous condition of the country in general has aided in the introduction of the automobile, and this same prosperity, which is becoming more and more manifest in the west, will continue the demand for machines in a rapidly increasing ratio year after year. Automobile stage lines are becoming comparatively common, and the smallest towns have their one or two automobiles, and the season of 1906 will find a heavy proportion of the total shipment of all light car manufacturers going west of Chicago.

I do not consider that the west will compare with the east in the number of sales made for some time to come. In the first place, the eastern roads are generally much better than the roads in the west, and the number of places of interest to drive to in the west are much fewer than in the east. The people in the east are far better able to purchase automobiles than those in the western states, excepting possibly people in such localities as Los Angeles. Of course, the improvement in the sale will be much greater in proportion in the west, but in volume I believe the east will always lead.—F. J. FANNING, Sales Manager, Haynes Automobile Co.

Of course anything that may be said from this office regarding the western market must be said wholly with a view of the situation as it applies to our class of motor cars and this means that, broadly speaking and owing to trade conditions which are thoroughly well understood, the value of the west as a market for high class cars is just commencing to develop and will, beyond question, develop rapidly from this time on. The sale of cars of the Packard class is necessarily centered in the larger cities.

The use of motor cars in the larger cities of the west is making rapid strides and as men who buy such cars as ours have connections in eastern cities and visit those cities frequently, they have, during the past year or so, been acquiring an education as to what a fine car really is and as to what it means for its owner, and the demand for high class cars in the west is rapidly developing and there are unmistakable indications in our office that another year will see long strides in the development of the large car trade of the west. At least that is my opinion of the trade situation.—L. W. CONKLING, Assistant Sales Manager Packard Motor Car Co.

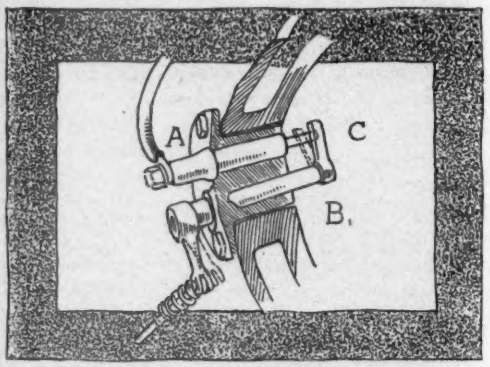
Just at the present time we are not making a very strong bid for the western trade, for the good and sufficient reason that the Corbin output for 1906 is sold—completely disposed of at the New York show—but I, like many of the others in the trade, readily recognize the possibilities opened up before us in the territory between Chicago and the Pacific coast. It's a grand field and I am sorry we are not in a position to go after the business that undoubtedly exists in that part of the country. But the west needs educating first in the way of better highways. Not until the entire section is ribboned with good roads will its full strength be shown. When the people out that way are able to use a universal tread and do not have to traverse mere ruts, then will automobiling flourish there. But as for the west supplanting the east in the automobile market, I doubt it, for the bulk of the population of the United States is in the east, and naturally the demand will be greatest there. Eastern manufacturers, though, are not overlooking the possibilities out this way, and they can be depended upon to do all they can to foster automobiling, not only in the east, but in the far west as well. Here at the show I have had many western visitors, some coming from as far as Montana. All of them tell me of the great possibilities of the west and I believe them.—J. S. BRETZ, General Manager, Corbin Motor Corporation.

We have not made much of an effort to cultivate the western trade, for we have had all we could attend to in supplying the demand for our cars in the eastern and middle west sections, but I believe the west is going to afford automobile manufacturers a grand field in the future. It is well worthy of cultivation and I for one will make a bid for our share of the business. From Chicago to the coast there are people who are just beginning to realize the possibilities of the automobile and it stands to reason that it will not be long before they will be ready to buy. Of course many cars are already going out that way, but this isn't a marker to what will come later on. The demand is not going to be for pleasure cars alone, either, for the westerners are progressive, and they will want commercial rigs, too.—EDGAR APPERSON, Apperson Brothers.

MAKE-AND-BREAK DEVICES

MAKE-AND-BREAK, the accepted form of ignition on most of the high-class European cars, but the sparingly-used system on American-built machines, is coming in for the lion's share of examination on the part of the spectators on the show circuit. Why European cars of such caliber as the Fiat, Mercedes, Peugeot, Darracq, Brasier, Mors, Rochet-Schneider, Martini, de Dietrich, Clement, Zust and many others should bank on this method of ignition and only a few American machines, such as the Columbia, Locomobile, Cleveland, Studebaker, Rainier, Matheson, Hewitt and Haynes runabout should adopt it, is a matter of speculation for the investor. An answer may be found in the fact that American genius has been absorbed in improving the gasoline motor, speed change devices and other parts, leaving the magneto very much alone, except in the cases of such houses as Remy, Splitdorf, Holley and Polyphase, which have worked steadily and with congratulatory results. Dry cells and storage batteries are so convenient—it being now possible to obtain the former in the smallest western town—that it is not to be wondered that our makers catered to the buyers in installing an ignition outfit in which the current supply could be obtained almost everywhere at a nominal cost. Then, too, mechanics have to be educated gradually and it was possible to grasp the fundamental of the jump spark scheme and connect dry cells quicker than to master the principles of the magneto and igniters.

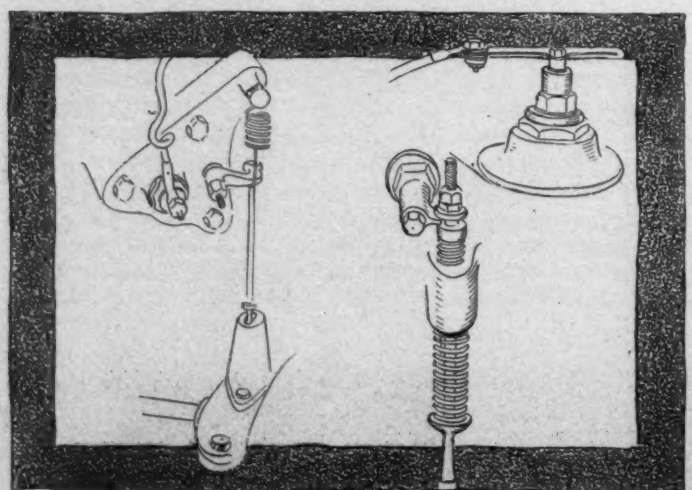
From present indications American builders prefer the high tension magneto to the make-and-break kind, presumably because the jump spark is an excellent igniting medium and also because the same cylinder design used for the storage battery with its coil and commutator will suffice for the high tension magneto with the same spark plugs serving for the magneto. With the make-and-break spark it is not so. A different cylinder and crankcase design must be used, in short, important changes must be made in the motor outlay. To commence: Instead of a spark plug entering each cylinder mechanical igniters are required. These, as can be noted from the illustration, consist, in every case, of two separate plug pieces entering the cylinder casting and extending into the combustion chamber. One of these marked A has a wire connection with the magneto and is a stationary electrode through which the current enters the combustion chamber. It corresponds to the central electrode in a spark plug which also conducts the current into the cylinder in a jump spark outfit. Close to this is another electrode B, a movable one which invariably has on its inner end an arm C which rests against the inner end of the stationary electrode A. This electrode with its arm has to be rocked to and fro so that the arm C will rest against the stationary electrode at which time the current will flow from the magneto through the stationary electrode and by way of the arm and its axis to the motor castings and then by a ground back to the magneto, thus completing the circuit. As soon, however, as the arm leaves the stationary electrode the current bridges the gap in the form of a short hot spark. From this it is apparent that a push rod or rocker arm mechanism, similar to that used in opening valves, is needed to work the movable electrode so as to make and break the circuit, and this frequently calls for an additional camshaft within the crankcase and a separate set of pushrods, one rod for each igniter.



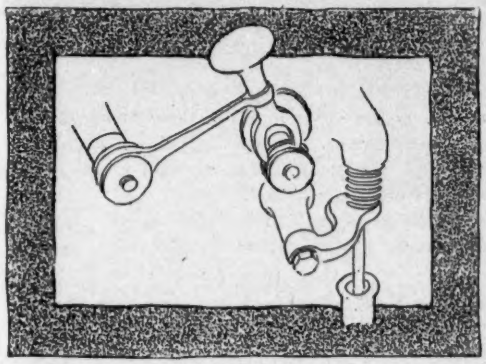
ESSENTIALS OF THE MAKE-AND-BREAK

Simplicity has been advanced as an argument in favor of the make-and-break spark compared with the jump spark. In generating the make-and-break spark a low tension magneto is needed and from its armature a single wire leads to a bus bar which lies along the tops or sides of the cylinders, and from which the current is taken into each cylinder through a knife switch or other similar means. A coil, on the dash, is not required, neither is a commutator, neither are high tension wires, there being no high tension current; consequently the only wiring scheme essential, in fact, necessary, is one solitary wire from the magneto to the bus bar, and it is rarely more than a couple of feet long. Wiring troubles therefore are not. Against this simplicity advantage must be counted the complications arising from a separate set of cams for operating the igniters, in fact, often a separate camshaft, as all makers do not carry the igniter cams on the inlet camshaft. Other complications are the two electrodes entering the combustion chamber. The compression must be maintained, which is often attended with difficulties in case of the rocking electrode. Another point to be mentioned that requires care is the keeping of all of the igniters in perfect adjustment so that the spark occurs in the several cylinders at the same point in the stroke. Wear in the many moving parts occurs, which must be taken up. The fewer the moving points the better, as the less opportunity for wear and, consequently, the less opportunity for poor synchronism, synchronism being a term applied to the timing of all igniters, so that the spark takes place at the same point in the stroke in each cylinder.

A passing examination of a score of make-and-break devices used on American and foreign machines reveals the expected fact that no two are alike, all differing in little details. In all, as before stated, there are the stationary and rocking elec-

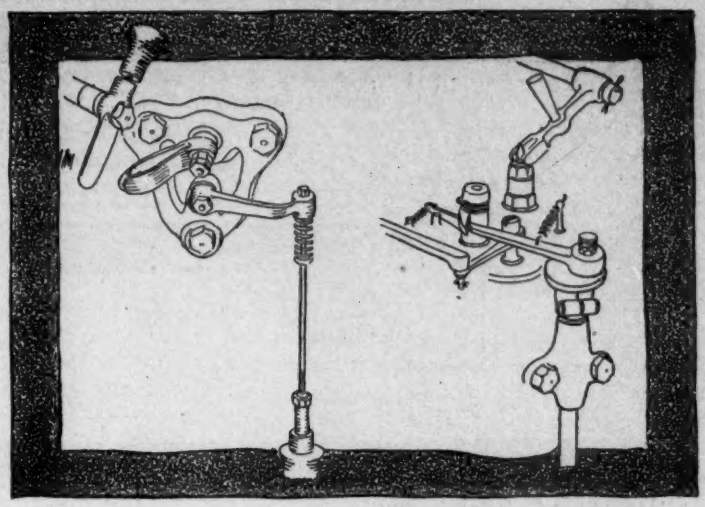

AMERICAN MERCEDES DARRACQ

trodes, but the method of mounting these in the cylinder heads and the method of rocking the one are legion. Regarding the location of the igniters in the cylinder castings it is of interest to note that Mercedes fashion is to place them in a little pocket off the corner of the valve port. The reason for this is difficult to account for, it being sufficient here to mention that the designer claims a quicker ignition of the explosive charge with the spark first occurring in the pocket than if it occurred in the main combustion chamber. In Fiat and Mors machines this pocket scheme is followed. A few cars like the Martini, Rochet-Schneider and the three American cars, Studebaker, Cleveland and Rainier, in which the same system is in vogue, carry the igniters on the top of the valve ports and have both the stationary and rocking electrodes carried side by side vertically in the igniter plates, which form the covers for the inlet valves. Other makers, the Columbia and Locomobile American builders, and foreign firms, like Clement, Fiat, Mercedes and Zust, place both electrodes in a horizontal position in the side, ends or corners of the valve ports and operate the rocking electrode through a straight pushrod action, whereas, cars with the trodes vertically in the tops of the ports use vertical rocker arms or revolving shafts with eccentric head piece. Then, there are the other makers who place the stationary electrode vertically in the top of the port and introduce the rocking one horizontally through the port side, the inner ends of both being close together. In this design pushrod action suffices for actuating the rocking member. Cars following this tendency are Darracq, Peugeot, Mors, Brasier, de Dietrich and de Launay-Belleville.



CLEMENT-BAYARD

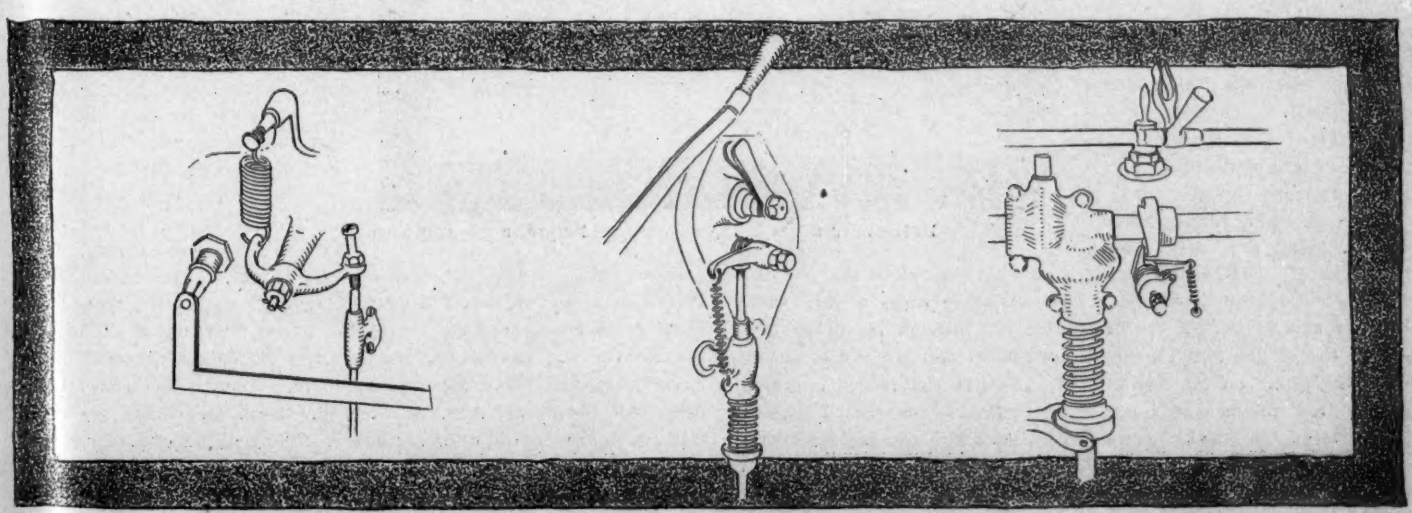
A too simple method of rocking the movable electrode is impossible. The fewer the rocking or moving parts the less chance for wear and the less opportunity for the igniters getting out of synchronism. With an igniter rocked through a device with four rocking parts there is four times the chance for the timing getting out as where only one rocker part is required. Examining in detail many of the actuation schemes used and commencing with the simpler methods, the Peugeot deserves first attention. Both the stationary and the rocking electrode screw into small cylinder openings, the former in the top and the latter in the side of the port. The pushrod, worked from the camshaft, at its upper end, passes through an eyehole in one



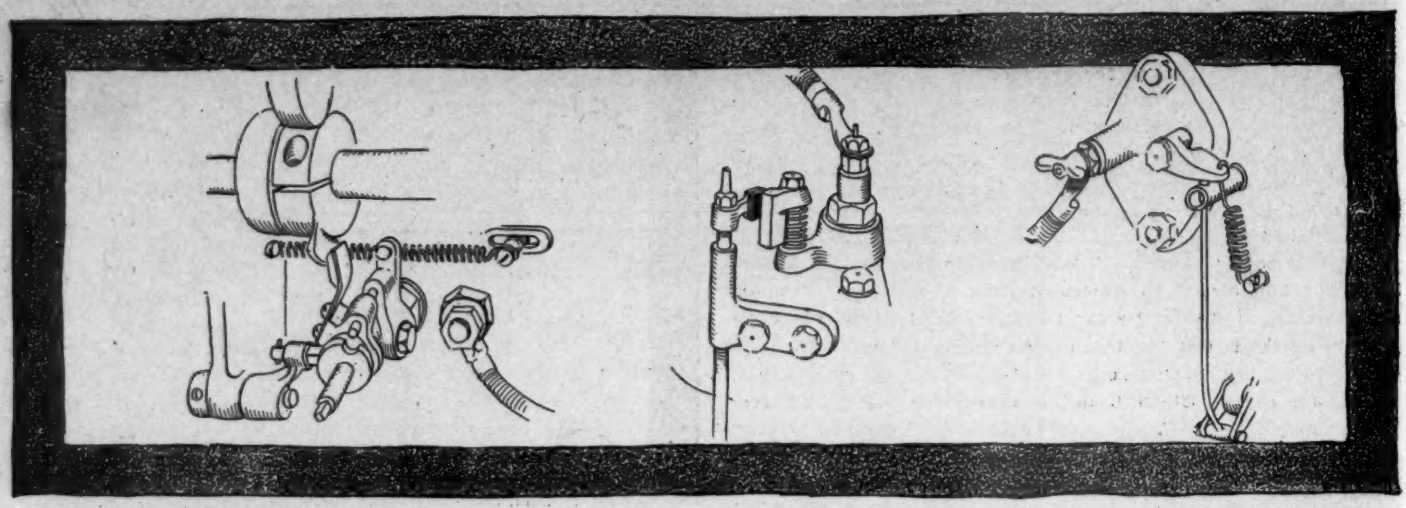
LOCOMOBILE CLEVELAND

end of the electrode rocker, the external arm on the rocking electrode. On the end of the rod are nut and lock nut, used for taking up wear. A spring connected with the other end of the electrode rocker holds the arm within the cylinder away from the stationary electrode, except when a coil spring surrounding the lower part of the pushrod pulls the rod down, thus pulling the right end of the electrode rocker down and so contacting the electrode arm with the stationary electrode within the combustion chamber, and closing the circuit. As soon as the cam within the crankcase raises the pushrod the spring, shown in the illustration, pulls its end of the rocker down and so breaks the circuit within the cylinder, causing the spark

The smaller Columbia car fitted with this type of ignition is simply constructed, being much like the Peugeot, except that the pushrod exerts its force by a direct lift instead of with a downward pull. A spiral cam on the camshaft raises the rod which, at its top, lifts one end of the electrode rocker through a short adjusting screw in the end of the rocker arm. This screw has lock nut and is for taking up wear in the cam or electrode bushing. The lift of the pushrod makes the contact and the coil spring coupled with the left end of the electrode rocker causes the break creating the spark. In this device the rocking electrode has a long bearing in the cylinder casting, the object being the preventing of loss of compression. The electrode rocker in the Fiat has but one arm, to the outer end of which the spring for making the break is attached and against the center of which the pushrod works. The top of the pushrod works in a guide carried on the port side and beneath it is a spring for keeping the bottom of the rod on the cam. Other than the cam within the crankcase there is but one rocking member in this outfit to show wear.

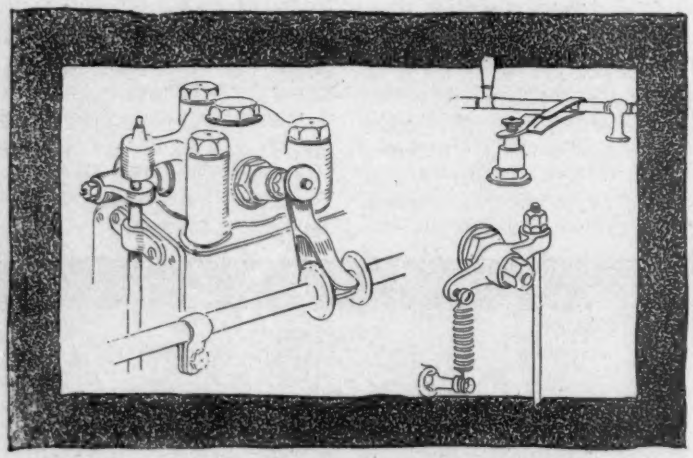


COLUMBIA FIAT BRASIER



MATHESON ROCHET-SCHNEIDER HEWITT

Complexity in working the rocking electrode is discovered in the de Launay-Belleville, which, however, is needed in order to dispense with a separate camshaft and still have the igniters carried accessibly on the corners of the valve ports. The cam movement is conveyed through a short plunger rod, the lower end of which bears on the cam and the upper end, terminating above the crankcase, receives a short cross arm, which is pivoted at the left end, and at the right end is pivoted to a vertical pushrod that, when raised, makes contact. The break is through a coil spring on the other arm of the electrode rocker. Besides the cam there are three rocking points in this arrangement—so many points to assist in obtaining incorrect timing. In the Mercedes there are no less than four rocking points outside of the operating cam. This is occasioned by the scheme resorted to in advancing and retarding the spark. Above the cam within the crankcase is a cross arm pivoted to a swinging piece at one end and to the pushrod at the other. The cam bears on the under surface of the cross arm. This arm can be swung to the right and left, so that at one time the cam bears on it near the end to which the pushrod is attached, giving a slower lift than when it bears against the other end of the arm. This occasions the use of three rocking points which move with every revolution of the cam, and to these must be added the rocking electrode movement. In the Mercedes the electrode rocker has a single arm which is raised by the pushrod for the make and the coil spring produces the break. In the Zust car the pushrod has a button top resting on the top of the electrode rocker, and through a spring surrounding the bottom of the rod the rocker is held down until lifted by the cam, when a coil spring above the electrode rocker makes the contact. The break is through the other spring at the bottom of the pushrod.



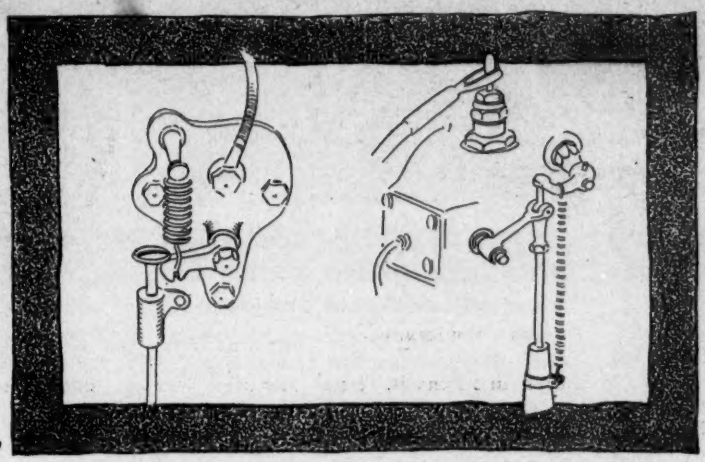
DEDIETRICH PEUGEOT

The Darracq igniter plan is entirely changed from previous seasons, being now very simple, consisting of a lifting rod with a circular disk near the top and above this an adjustable disk. Between these disks a very short electrode arm is carried, the lift of the rod through the upper disk making the circuit and the break occasioned through a coil spring below the guide on the valve port. The lift rod is not operated directly from the camshaft, but being further to the side, little side extensions on the crankcase are needed, and in these are the necessary parts for working the lift. In the Locomobile and Clement, straight lifts through pushrods are used. The Hewitt operates through a separate camshaft carried at the side of the motor halfway up on the cylinder sides. Over this shaft are cross rocker arms, one for each igniter, and to the outer ends of these arms are pivoted the slightly curved pushrods. Contact is made within the cylinders by direct lift and the break comes through a coil spring attached to the end of the electrode rocker.

Entirely different methods of actuation rule in the Martini and Rochet-Schneider, both of which, while different at first glance, are very similar. A vertical rocker arm rises from the crankcase to the cylinder head. On the bottom of this rod is a short arm on which bears a face cam on the camshaft within the case, so that the cam in passing the arm imparts a part revolution to the vertical rod, which movement is transmitted to the rocking electrode through a short arm on the top of the vertical rod and a similar arm on the electrode. The contacting faces of these arms, which take the form of square pieces, are covered with leather to deaden the noise. The circuit is made by a positive push and the break is through a coil spring surrounding the top of the rocking electrode stem, the lower end of the spring being rigid and the upper end embedded in the electrode arm. In the Martini the same form of face cam within the crankcase is used, but a more complicated arrangement is called into use on the cylinder heads. The vertical rods having two arms and the electrode rocker having two also, two coil springs are required, that on the electrode arm for making the break and the other for holding the vertical rod's arm in contact with the arm on the electrode.

Then, too, in the Brasier car, which shows a completely new scheme, novelties appear. The camshaft is carried near the cylinder heads and on it are face cams, one of which is shown. These cams operate against a short vertical arm on the rocking electrode, so that the face cam passing thrusts this arm to the left, closing the circuit, but as soon as the cam has passed the arm is drawn to the right through the coil spring, thus breaking the circuit and producing the spark. The camshaft is driven by a vertical shaft from the camshaft within the crankcase, bevel gears being used for taking the power from one shaft to the other. On the Cleveland, Rainier and Studebaker machines a novel make-and-break scheme, which has recently been minutely described in MOTOR AGE, is adopted. Both electrodes are carried vertically in the cylinder heads. The rocking one carries on its top a hook-like arm, against which bears a long lever, with its other end working on a bearing on the enlarged eccentric top of a revolving shaft driven from the crankcase. As the eccen-

tric comes into action the long lever pushes against the lever on the rocking electrode until it trips off the end of it, at which instant a coil spring, shown to the left, returns the rocker arm to its original position and accomplishes the break. In timing this spark the eccentric lever near its center bears on a fulcrum which can be moved in or out, and as it is moved out the eccentric lever pushes on the rocker lever nearest its end, giving a slower spark than when the fulcrum is moved in and the eccentric lever bears on the rocker lever near its inside. The Matheson car follows Brasier lines, in having its igniter camshaft located well up on the sides of the cylinders, and on it are face cams of peculiar design, the cam portion being like a propeller blade projecting from the periphery of the cam piece. This piece contacts with a scooped-shaped arm on the rocking electrode. A cross coil spring breaks the connection within the combustion chamber. Other machines, like the Berliet, Mors and de Dietrich, have straight pushrod action.



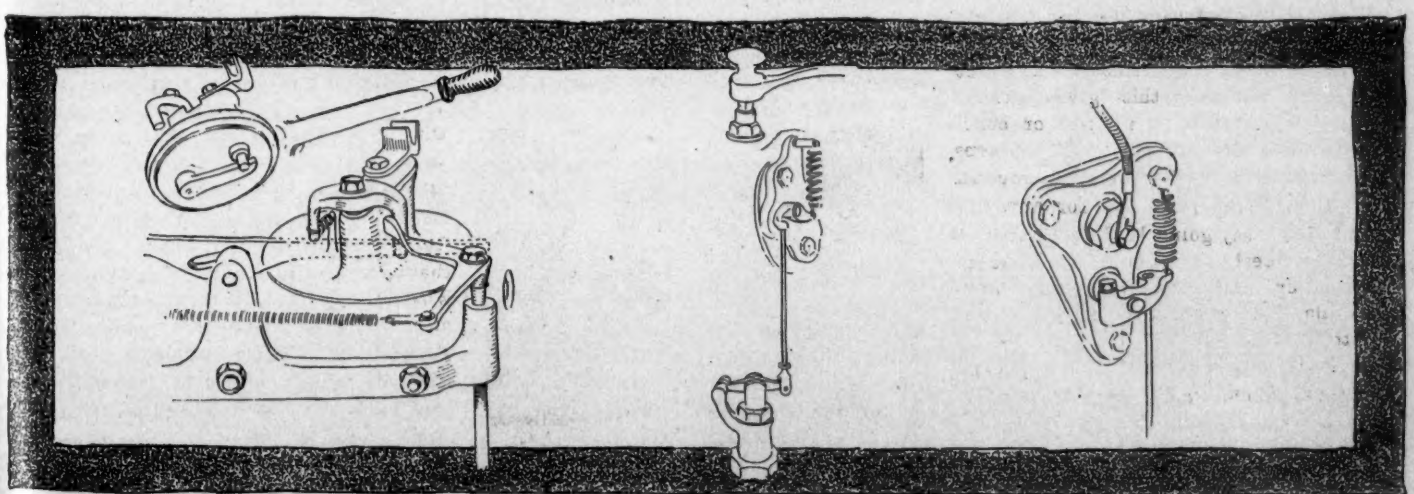
ZUST MORS

Advancing and retarding the spark in make-and-break devices is much different from that in the high tension ignition outfits, the rocking of the one electrode having, by one means or another, to be accomplished later for a retarded spark and earlier for an advanced spark. The two American concerns, Locomobile and Columbia, do this by using spiral lift cams on the camshaft and sliding the camshaft bodily to the front or rear, the cam raising later or earlier as it is carried forward or back. In the Brasier system the vertical rod driving the camshaft is divided into two parts, an upper and lower, and both united through a sleeve piece with a spiral slot, so that by raising the sleeve the top part of the shaft is advanced slightly ahead of the lower portion and lowering the sleeve retards the top part. This action, as well as that in the Columbia and Locomobile cars, is accomplished from the steering wheel. In the Martini and Rochet-Schneider machines the vertical rocker arms are raised or lowered so that the face cams begin to operate earlier in one case than the other. In the Martini the changing device is on the top of the cylinders and assumes the form of a horizontal steel bar with one end resting on the top of the rocking rod. In the bar are angular slots and connected with it from the hand wheel on the steering column is a lever, by which it can be drawn back or forced ahead; when drawn back the angular slot with its cross bolt raises the rod, and when thrust ahead lowers it. The raising and lowering device in the Rochet-Schneider is within the crankcase. In the Matheson the arm on the rocking electrode can be moved closer to or farther from the cylinder, causing the face cam to operate earlier or later. The Fiat has an automatic advance and retard; in the Brasier the method was shown, but it should be borne in mind that this is only used in starting the motor to avoid a back kick, and that when running there is only one position for the spark; the Peugeot changes the time by advancing or retarding the armature lead in the magneto; the Mors spark is not changed while running, neither is that in the Clement, and in the Darracq, Zust and Berliet spiral cams with a sliding movement are used.

As to the best grade of metal to use in the contact points within the combustion chamber, diversity is paramount. American machines favor iridium on these hammer and anvil parts, as they are frequently termed, because of the non-corrosive properties of this metal, and its capability of withstanding high temperatures without softening. It is essential that these points retain their rigidity because, if not, the constant hitting of one on the other would soon result in a little hollow in one or both so that the push of the lift rod would not be sufficient then to make a positive contact. Hardened steel suffices in the Rochet-Schneider; in the Zust chrome nickel steel is furnished; platinum is supplied in the de Launay-Belleville and Peugeot, and also in the Berliet and de Dietrich, and in the Hewitt Norway iron carrying hardened platinum tips is adopted.

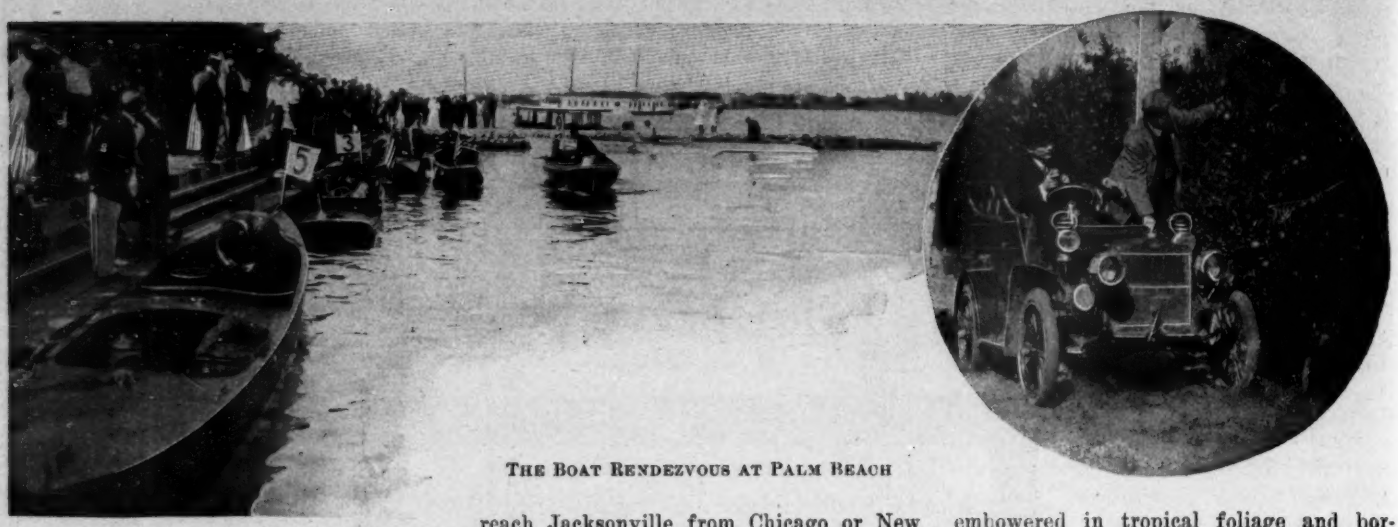
Cutout switches to the tops of the stationary electrodes are quite generally used and have the advantage of a quick testing of any cylinder without loosening wire connections. These switches take two entirely different forms, one exemplified in the Locomobile cars being a knife blade pivoted at its center to a support on the igniter plate and having a hand piece for moving it. Cars with one style or another of this switch are Clement, Brasier, Martini, Mors, Cleveland. The other switch form is a fiber spool on the bus bar and has two sides cut away, so that when in one position the spring pieces from the stationary electrode to the bus bar rest directly on the metal of the bar, but giving the spool a quarter revolution they rest on its fiber, being cut off, as it were, from the bar. The Peugeot uses this method.

It is interesting to note in concluding that methods of cutting out the spark from the cylinders are provided in almost every make but in the Mercedes, in which the throttle alone can stop the motor. Fiat has a pullrod for this purpose.



MARTINI DELAUNAY-BELLEVILLE BERLIET

QUIT ORMOND AND PALM BEACH FOR CUBA

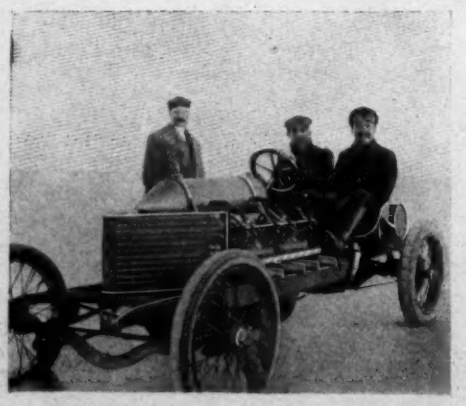


THE BOAT RENDEZVOUS AT PALM BEACH

MIAMI, Fla., Feb. 2—Automobile touring has been added to Florida's winter pleasures. The racing on the Ormond-Daytona beach suggested to Floridians the desirability of the addition to the state's winter attractions of another feature of motoring—touring. Henry M. Flagler, the state's Prince Bountiful, who made garden spots to bloom amid this pine, palmetto and palm wilderness, has gone a step further. Through his liberality and influence the state has built a road worthy of the name and bidden the motorists to come and see and try it. It has been 4 years in building. It has just had the finishing touches put to it. Now from beautiful Palm Beach to picturesque Miami there stretches a 66-mile ribbon of smooth, white highway, that use will before long smooth into a cement path. It is built of coquina rock, which is soft, easily quarried, and readily crushed into a smooth, hard surface. The beautiful path along the front of Lake Worth is made of it. That shows its road-making possibilities. To be sure, with little turning to the right or left by vehicles owing to the comparatively unfrequent traffic, there is a tendency for it to wear into ruts with grass between, but the ruts are broad and smooth and easily followed. Though the surface is smooth it is not altogether level and this gives gentle, though by no means wearisome or bone-racking jolts. It is all right if one keeps the pace of his car below 30 miles an hour, which is fast enough for any one in this lazy, easy-going land of Florida.

But the best of it all is that it is probably but the beginning of a system of similar automobile paths, that it is safe to prophesy will stretch before many seasons for 500 miles down the Florida east coast from Jacksonville to Miami, and quien sabe!—we are in the land of the Spaniard now, you know—may some day extend as far south as Key West?

What a paradise for the winter tourist a-motor is in prospect? One may now reach Jacksonville from Chicago or New York in 24 hours. Some day soon he can meet his automobile at the pier at Jacksonville and drive in it to quaint, old St. Augustine; Ormond and Daytona, of racing fame; beautiful Palm Beach, and Miami, the piscatorial paradise. What a month can thus be spent with an easy day's run on either side of each of these visits to its neighbor. So it would seem that the building of the new road marks an epoch in automobiling, as did the Flagler creation of the Florida east coast system of resorts in the winter life of the well-to-do. We circuit chasers tonight—thanks to a happy idea of Senator Morgan's—know whereof we speak; for we were members of the first formal exploring party of any considerable size to go over the road. We left Palm Beach this forenoon in six cars—three White steamers from the Palm Beach garage and a Cadillac and two Ramblers from the garage which our old friend, C. R. Zacharias, of Asbury Park, has established at Miami. It was a memorable day's run. Though some of the journeying was through rather barren Florida coast land, past woods of palms, palmetto and pine, yet there were pineries, tomato fields and orange groves to tell of civilization. There were some mighty pretty stretches along water-bordered causeways. We crossed many bridges and at times stopped at creeks, embowered in tropical foliage and bordered by trees hung thick with moss, to gaze into their clear waters and see the swarms of pickerel and other fish swimming in them. Then there were the negro cabins and their broods of piccaninnies, who grinned with glee, yet fled in terror at the pointing of a camera.



DEMOGOOT IN THE DARRACQ

At noon we stopped at the inn at Fort Lauderdale, the Seminole Indian trading post, for dinner. The little hamlet is in the new river dam, which the Seminoles paddle or pole in their canoes from the Everglades, for 5 or 6 miles distant, with their otter and other skins, to trade for supplies, trinkets and fire water—the grim Florida aboriginal, like his brother of the west, is a mighty booze fighter—and what a time and what a dinner we did have as the guests of mine host, R. A. Bryant!

Filled to satiety with the trashy variety of Palm Beach culinary concoctions that good, old southern dinner did taste good. Such escalloped oysters! Such honey! And such biscuits! One of the party swore he'd kiss the cook that made those biscuits, be she black or white. It was a good gamble, for there were some mighty pretty southern girls hovering around, who might have had something to do with the kitchen. But when the grinning waiter boy owned up to having been the cook himself, there was a great laugh on the would-be kisser and it cost him a penny or two in tips to get let off. Dinner over, the touring outfit gathered on the veranda. Here they made a rich find in a yellow 13-year-old piccaninny answering to the name of Charlie Miller. Remember that name, for two or three of the party made overtures to his father with the idea of transferring him to automobile row, New York, in the near future. He could sing, he could dance, he could do card tricks—"ef de gemmen won't git mad ef I fool 'em"—and he had an answer ready for every gag of the smart Alexanders of the party. He was given his first automobile ride and so were two or three of the pretty Florida girls at the hotel. There was not a man in the party

who did not make a resolve to come back some day on the quiet for a week at Fort Lauderdale, with Colonel Bryant, those pretty sisters and cousins of his and Charlie Miller.

As Miami was neared the road improved and there was a chance for some speeding. The pilot car while thus engaged put an old white horse, a skate drawing a wagon, and a couple of diminutive coons, in the ditch. Lazarnick caught a snap of the kids engaged in repairing their haymobile. A few miles further down the road we came across an interesting sight in a cochina rock quarry with a gang of over fifty convicts at work. They were watched by a single keeper with an obtrusive gun, while near at hand was a pair of bloodhounds, in case any convict should get a start in a runaway. Our party engaged in informal banter with the gentlemen in stripes, while Lazarnick was having the time of his life taking pictures of the convict camp.

"Just tell Mr. Hearst what we're doing," called out one, who evidently knew the newspaper magnate as an opponent of convict labor.

"What you're doing serves you right for voting for him," was the reply from an anti-municipal ownership man in an automobile.

"I'm for George B. McClellan; give me some tobacco."

He got a quarter.

"When I get out next April I'll give you all a chew," was the sally of another convict.

He got a quarter, too. It must be understood that road building by convict labor is in vogue in Florida. This road was for the most part so built. In the discussion which followed among the tourists as to the advisability of convict road making the affirmative side of the question had rather the better of it.

A half an hour later the motor caravan bowled into Miami and up to the porch of the Royal Palm hotel. In the foyer tonight are shown some enormous fish, selected from the day's catch. The boys are wild to be out in the ocean, bay and river after them tomorrow and Sunday, before setting sail for Cuba on Monday.

FINISH OF THE RACES

Palm Beach, Fla., Feb. 2—The 4 days' regatta of the Palm Beach Motor Boat Association was brought to a notably successful end to-day with the contest for the Sir Thomas Dewar trophy, a silver shield to

A SOLO BY SENOR WETMORE

be won twice, emblematic of the world's mile motor championship afloat, as its chief feature. The result was highly pleasing to the automobile circuit chasers, for Herbert L. Bowden, that prince of sportsmen and most popular of motorists, won it with his Mercedes U. S. A. It is interesting to note that the winning boat was equipped with the two 60-horsepower Mercedes engines coupled Bowden drove when he scored the world's fastest motor-car mile in 32⅘ seconds at Ormond last year.

There were four contestants—H. L. Bowden's Mercedes U. S. A., George Gingras' 23, H. C. Thompson's Limit and Lieutenant H. L. Willoughby's Possum. The boats were given two trials. The first proved the faster, Bowden's boat covering the mile in 3 minutes 6⅗ seconds. The 23 was second each time. The contestants were started together and the race was the best of the whole regatta.

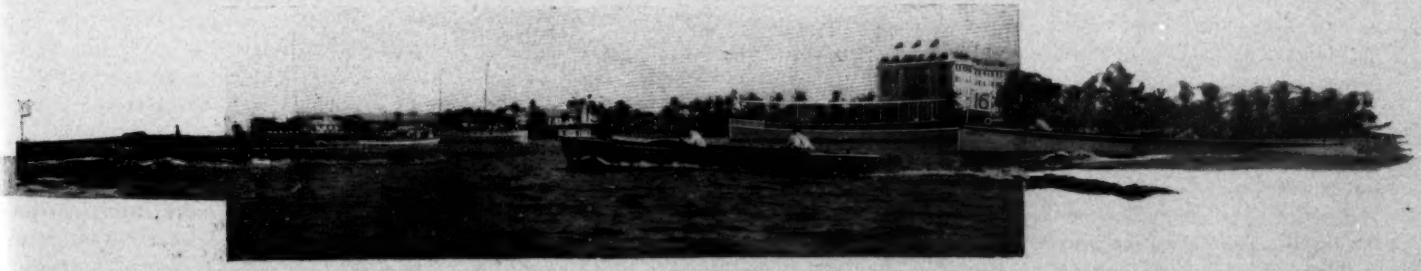
There was much improvement in the handicapping during the last 2 days, the allowances being made on actual performances instead of on a fixed rating based on horsepower, beam and length. To a layman, confessedly ignorant of the motorboat racing game, it would seem that the public would be better pleased were there more short races on the program, requiring but one leg of a 5-mile course or less, and that there would be better chance for the boats to finish within sight of one another instead of in tiresome processions with long gaps between and none but the judges and close watchers knowing the leaders from the tail-enders. It would seem that there might be a segregation of boats in classes permitting of more scratch and fewer handicap contests.

There was a fine fleet of boats on hand during the week, the individual entries numbering twenty-three, of which at least a half a dozen craft were of national reputation. Lake Worth has proved a fine course, and the annual regattas seem likely in future to be among the most important on the year's motor-boat racing calendar.

CLEVELAND SHOW OUTLOOK

Cleveland, Feb. 6—Every inch of space has been taken for the coming automobile show to be held at Central armory the week of February 19 and the indications are that this will be one of the greatest local shows ever held. This year there are 150 spaces whereas previously the most that could be figured out for old Gray's armory was fifty-five spaces. Every leading manufacturer in the country is now represented in Cleveland and will exhibit, so the show will be more thoroughly representative than ever before. Several local manufacturers and makers from this district who did not participate in either of the New York shows will exhibit here, as will quite a number of specialty manufacturers. The scheme of harmonious decorations and uniformity of signs which beautified the big national shows this year will be carried out here. Every effort will be made to preserve the individuality of each exhibit and to give an imposing and unique effect.

A most interesting line wil be displayed by the Gaeth Motor Works of this city, a concern which has been quite a figure in the local field but which has never exhibited at the national shows. This company will show three models, a 20-24 horsepower car at a moderate price, a 50-54 horsepower heavy touring car and a gasoline delivery wagon which the company is featuring. The simplicity of the motors and improved cooling systems are the features of these machines. The Palmer Automobile Co., which is a new comer in the local field, will exhibit a light runabout fitted with a two-cylinder two-cycle engine which transmits power to the wheels by rope drive and which will sell at $400. The Hipp-Reitz & Hall Co., a new sales agent, will handle the product of the Moline Automobile Co., of East Moline, Ill., and will show its line. The Holmes-Booth Co., another new one, will have the Pope-Hartford and Pope-Tribune lines. The White Sewing Machine Co., the Winton Motor Carriage Co., the Baker Motor Vehicle Co., the Royal Motor Car Co., the F. B. Stearns Co., and the Peerless Motor Car Co. will exhibit through their local branch stores or agents.



MERCEDES, CARITA AND DOROTHY AT PALM BEACH

MOTOR AGE

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CHICAGO SHOW THE NATIONAL SHOW

EACH year Chicago's motor car show has grown almost beyond the expectations of the most optimistic; each year the interest in automobiles has been intensified; each year the exhibition has been improved until today it has surpassed the grand display in the metropolis of the country that annually inaugurates the show season.

It is not because MOTOR AGE has its home in Chicago that it freely states that the 1906 Chicago show exceeds the New York affair; it is because the most casual observer of trade conditions and trade results does not hesitate to say that at last Chicago has surpassed its big sister, New York, in the matter of shows.

It may not have as many cars on view; it may not be visited by as many beautifully gowned members of the fair sex; it may not have the first call and consequently the greater amount of publicity—but it keeps up its reputation in the amount of business transacted and of profits earned. The show in Madison Square garden and the Sixty-ninth regiment armory was grand—in attendance, in appearance, in all ways. The show in Chicago even exceeds New York; not in these respects, perhaps, but in the amount of business transacted from the standpoint of the maker.

The east has been prone to regard Chicago's show as somewhat of a wild and wooly local affair. New Yorkers live in their own little burg. They see nothing that exists outside of Madison Square garden or New York at best. They forget Chicago is on the map.

In the matter of actual retail sales New York undoubtedly leads Chicago and always will; in the matter of outside business, of sales to bona fide automobile agents, it falls far short of Chicago. All of which naturally indicates that the show in New York is the local show and that in Chicago the national affair, rather than the reverse, which is New York's opinion.

It is a safe statement, based entirely on the statements of exhibitors, that while retail sales in New York exceeded those which will be made at Chicago, the number of agency deals consummated in Chicago far exceeds those closed in New York, both as to number and amount of money involved. This alone indicates the national character of the Chicago show as compared with that of the metropolis. It must in all fairness be said that this applies chiefly to automobiles. The accessory business naturally follows the sale of cars, so that the accessory business of the west must fall behind that in the east until such time as the west has been plastered with automobiles.

Year by year Chicago's show has grown in the estimation of the manufacturer and the public until today it is the equal if not the rival of the great New York exhibition. It has been improved in all ways—in magnificence, in attendance, in elaborateness, in the amount of business transacted. The only trouble is that which bothers New York—a lack of space to show all the makers desire to properly show—and the solution of this problem is one which is anxiously awaited not only by the management of the shows but the manufacturer and the public as well.

The maker who exhibited his wares in both New York and Chicago must be impressed not only with the difference in the amount of actual business transacted, but in the matter of cost for show space. In the garden exhibitors were charged 75 cents per foot for space; in Chicago the price was 40 cents per foot, and this price included every form of decoration and care, the exhibitor having nothing to do but install his wares and begin his attention to the public. The difference in the price for space alone is enough to convince the makers that Chicago is giving not only a most gorgeous exhibition, but one which can be put down as a profitable investment to all concerned.

Chicago is proud of its show, which is truly western in all ways—in design, in management, in business, in attendance, in interest. It is welcomed by the public and the next affair will prove of greater interest than this one. It means much for Chicago, much for the west, and much for the manufacturer who can see that beyond the Adirondacks there lies a fertile field for the motor car—the field of the future. Its local color is nothing; its national character everything. It is the representative show for the territory from the middle east to the great west; it represents miles upon miles of territory and thousands upon thousands of people, people who have money with which to purchase pleasure and commercial cars and only await an opportunity to part with that money. Will the manufacturer profit by the lesson being learned at Chicago and cultivate the immense trade field which opens to him west of Chicago?

FOLLOW HORACE GREELEY'S ADVICE

HORACE GREELEY'S advice to the young man to go west may well be directed to the automobile manufacturer, who must now appreciate the fact that competition in the eastern part of the country is so great and the western trade has been so neglected that a new selling field must be sought and found in the great western states.

Can the manufacturer of automobiles and the manufacturers of accessories desire any better evidence of the fertility of the great west as a selling field than the presence of the thousands of people from all sections of the land of the setting sun at the show now under way in Chicago?

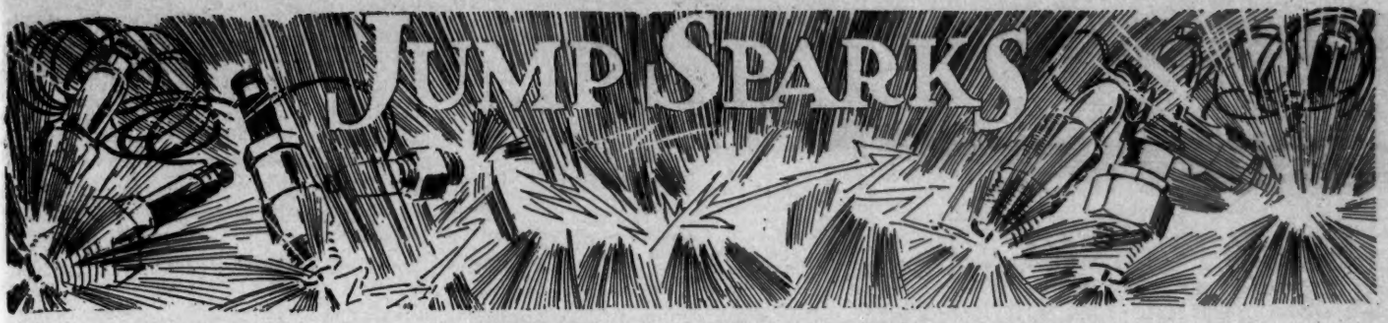
While the great west has been clamoring for motor cars the manufacturer has been neglecting it for the great east. But the great east is rapidly becoming supplied and the manufacturer must, in order to dispose of his output, seek a market in the great west.

The presence of hundreds of agents and would-be agents from the west during only the first portion of the week of the Chicago automobile show is ample evidence of what may be expected from the west in the matter of purchasing. The number of agents in attendance this year is more than treble the number of any previous year. This alone is significant; it is evidence that motor cars are wanted by the west; it shows that the western dealer does not buy until he knows his ground.

The motor car for the west, however, must be suited for western work. It does not follow that what will suffice for the eastern market will do for the land beyond the Mississippi river—that land is of a different nature and requires different goods.

The west needs cars, but it needs cars of different design than those that will suffice for eastern work. It is folly to presume that good roads will follow the automobile for at least a number of years; it will be necessary for the maker to meet existing conditions and to supply cars that are adapted to western needs and to western roads, as they may be called.

Watch the great west grow as an automobile market; watch the dollars of the ranchman and the farmer; build for them what they desire and what they need and the motor car industry will grow apace.



Father Time has one consolation up his sleeve—the automobile can't get the mile record down to nothing.

⁂

De Moegot, Demoquet, Demogeot or Demogoot, it doesn't make any difference—he did the 2 miles in 1 minute, just the same.

⁂

Those little snow flurries last week were only reminders from the weather man that Sam Miles had not sent him a ticket to the automobile show.

⁂

Fast as the motor boats traveled at Palm Beach, their speed pales into insignificance when compared with the flights of Marriott and Demogoot.

⁂

Like a well-regulated prairie dog town out in Kansas, all is peace and harmony at the Chicago show, the prairie dog, the rattlesnake and owl running things in true municipal style.

⁂

One man has driven from New York to Chicago and strange to say, there hasn't been a peep about record-breaking speed performances, the car going at 50 miles an hour, dashes to avoid the cops, and the usual lot of twaddle that often accompanies such a trip. Surely the sane tourist must have arrived. May his numbers increase.

⁂

The American makers seem to be too busy to become worried over the Renault shaft-drive patent; which suggests that, inasmuch as the continental makers are worried, perhaps they might have more to do than they have just now.

⁂

It doesn't require a very wide stretch of imagination to look around the coliseum and believe that Sam Miles is a direct descendant of Michael Angelo. He's better than Mike, though, for he combines an artistic taste for decorating big buildings with ability to run an automobile show.

The Week

Fifth annual show of National Association of Automobile Manufacturers opens in Chicago; attendance larger than ever and dealers flock to coliseum and armory from all parts of country; weather man dishes out usual wintry blasts.

Motor boat regatta is concluded and southern circuit chasers, after a pleasant trip by car from Palm Beach to Miami, advance on Cuba for carnival.

Percy Megargel, traveling through New Mexico, complains of lack of bridges, Reo Mountaineer being delayed by having to ford every stream.

Crystal Palace show, second of England's automobile exhibitions, proves to be something of a frost, little interest being displayed in the affair.

Details of great French tour are arranged by Marquis de Dion, who placates Germans and jollies Austrians; repairs to be penalized one point.

Philadelphia and Cleveland announce lively interest in their shows, which will be held later in month.

Skidoo, vamoose or sneak would have done just as well, but there is a particular slanginess about 23 as applied to the motor boat that competed at Palm Beach that seems decidedly apropos.

Biting off your nose to spite your face may make a good meal, but Hemery will probably go hungry next time rather than pay for so expensive a dinner.

⁂

After New York it would seem that there were no outputs left unsold. The press agent will have to scratch to find something new for Chicago.

⁂

"When you're ready, Fest, let the festivities begin," said Major General Miles Saturday before the doors of the Coliseum and the armory were opened.

⁂

Chicago has had its initial official non-stop run, but the Windy city cops claim it is not the first one by any means—they have a dozen cases of non-stop every day on the boulevards.

⁂

As if to lay Forecaster Cox, of Chicago, in the lie, the old woodchuck came out of his hole last Thursday, took a pike at the sun, saw his shadow had not deserted him, then crawled back for another 6 weeks' snooze. There may be a month and a half more of winter, but as has been proven this time, there are winters and winters.

⁂

Opinion given by the visitors: "If the police were half as zealous suppressing crime in Chicago as they are to gain cheap notoriety through pestering out of town chauffeurs caught driving without Chicago licenses the show town would be an ideal city. It's all right to stop scorching but there are such things as policemen making nuisances of themselves."

⁂

It was a hard blow the New York show management gave some makers when they ruled that tags denoting the sale of cars to prominent personages should not be placed on exhibit cars. The rule, however, did away with many embarrassing situations. Ordinarily it was found that some particular millionaire had purchased anywhere from one to a couple of dozen motor cars of different makes.

THE RESULT OF YOUTHFUL INCLINATIONS

CRYSTAL PALACE TAME AFFAIR

Only Thirty Distinct Types of Cars Exhibited at the Second English Show—Affair Runs More to Accessories Than Automobiles—Few New Ideas

London, Jan. 27—The automobile show, which opened at the Crystal Palace today, is but a very pale reflex of the Olympia exhibition of last November. In all there are scarcely thirty distinct types of cars on exhibition and in almost every instance these have been submitted to the public at the Olympia show. The full list includes the Fiat, Itala, Corre, Rochet-Schneider, Vinot, Humber, Pilain, Brown, De Salvert, Pope-Tribune, Hurtu, Minerva, Vulcan, Decauville, Jackson, Horley, Maxwell, Gregoire, Darracq, Spyker, Ryknield, Ford, Brouhot, Mobile and Barnes. Among all these probably the only real novelty to be seen is the 30-horsepower Pilain, in which the usual gearbox is dispensed with and a direct drive is secured on the three speeds. This is simply done. The propeller shaft from the engine is provided with three crown bevels on its tail end, each running free. These engage with the usual differential bevel cog, but this latter is provided with three concentric sets of teeth, each of which mesh in with one of the crown bevels. These are always in mesh and the drive is transmitted to the desired crown bevel by merely sliding an internal feather operating through the hollow propeller shaft, this feather locking the desired crown bevel to the propeller shaft and so transmitting the drive, the crown bevels, which are not ransmitting power, running idly. The reverse it provided through a second pinion on the differential shaft on the other side of the propeller shaft crown bevels. This is drawn into an engagement with the low speed pinion, in this way reversing the direction of the driving shaft. The other features of the Pilain were recently described in MOTOR AGE.

The show itself is confined to the main floor and does not invade the galleries or any of the side courts which a few years ago were crammed to repletion. There is no disputing the admirable facilities which the Crystal Palace building gives toward any scenic display, but little attempt has been made in the present instance to take advantage of this. The exhibitors have not spent money lavishly, and it is very evident that the whole affair has been entered upon with a certain degree of caution suggestive of timidity regarding its commercial success. The most elaborate stand in the palace is that of the Itala company, which takes the fanciful shape of a domed tower of white wood fretwork, backed by blue material. The Veno car is also artistically set out, as is the Humber, but taking it all round no great attempt at display is made. It would not be unjust to say the show is rather one of accessories and equipment than of motor cars, good undoubtedly as are the cars that are shown, but when one regards the tremendously crowded character of the Olympia exhibition and compares it with the scantily scattered show made at the palace charity forbids carrying the comparison. America's contribution consists of the Pope-Tribune, the Ford and the Maxwell. The only English cars shown are the Humber, the Vulcan and the Barnes, and it is doubtful if this last named is entirely British built.

Another fresh face is the De Salvert which, however, has nothing out of the common to attract attention to it. It is merely a French car constructed on the usual accepted lines, a very smart and handsome looking article, but that is all. The Spyker car is shown with a complete pressed steel frame of a boat shape, the steel plate coming right around underneath the engine, entirely enclosing the clutch and gear and effectually protecting these parts from dust and dirt. The rear end of the chassis is curved round in boat shape giving a one-point suspension for a traverse spring at the rear coupling up with links to the rear live axle. The engine is of 20 to 28 horsepower, with mechanically operated valves and four cylinders cast in pairs. The ignition is by high tension Simms-Bosch magneto, and the cooling is by direct gear-driven pump, with a belt-driven fan at the back of the honeycomb radiator. The special type of carbureter has throttle control, which also controls the amount of air drawn into the mixture, and is governed from the steering wheel. Both the engine and the gear are dropped into the pressed steel frame and secured by four right and left hand nuts. Both engine and gear can be quickly disconnected and lifted completely out of the chassis. The drive is by means of a leather cone clutch, and a Mercedes type of sliding gear, with three speeds forward and a reverse, with a direct drive, of course, on the top speed. At the rear of the gear box is the foot brake, a metal-to-metal type enclosed in the gear box casting and operated by a foot pedal. The drive from the gear box is by means of a large cardan shaft fitted with a right and left hand sleeve, which can be easily drawn back to allow of the gear and shaft being disconnected. The shaft drives direct on to the outside bevel wheel of the differential in the live axle at the rear; in the rear hubs fitted with internal expanding metal-to-metal brakes operated by a hand lever. The operating pedals are in the form of wooden footrests in place of the ordinary small metal foot plate, thus allowing of greater ease and a certain amount of freedom of action of the feet, giving a restful instead of a cramped position. The worm and segment box of the irreversible steering is mounted on a pivot controlled by a spring, allowing a certain amount of elasticity in the steering, and taking up the swaying motion which helps ward off cramp in the hands when steering. The firm show one of the gears of its differential which has been driven for 18,000 miles, and which shows practically no sign of wear. Ball-bearings are used on the whole of the working parts.

In the new 18-horsepower Rochet-Schneider car the frame is of pressed steel in one piece, cambered and stepped in at the dashboard in both chain and cardan shaft types, but in the latter instance the frame is also stepped upward over the rear axle in order to give spring clearance for the vertical movement of the differential gearcase under road shocks. A metal casing extends underneath the frame from the radiator to behind the gearbox, thus protecting the working mechanism from road dirt, dust, etc. The engine is of the usual four-cylinder vertical type with a bore and stroke of 4 and 5½ inches, showing its stated power at 800 revolutions per minute. The valves are mechanically operated, are interchangeable, and situated on opposite sides of the cylinders, which are cast in pairs. Camshaft gears and gears operating magneto and pump are all enclosed in the same casting as the crank chamber. The magneto is situated on the exhaust side, and can be detached without interfering with the gear wheel. The water pump is placed on the carbureter side, and can also be detached without interfering with the driving pinion. The carbureter is of the automatic type, pressure-fed from a tank situated at the rear of the vehicle. It is conveniently placed and very accessible. Low tension magneto ignition is retained. An automatic compression release is fitted so the operation of engaging the starting handle releases the compression, the cut-off for this being also automatic. The flywheel is large and fitted with vanes which induce a current of air through from the engine. Water cooling is by pump through a cellular radiator in front, which is also assisted by a fan driven by belt off the induction camshaft. The clutch is of the metal-to-metal type, giving a very easy engagement and obviating possibilities of shock in changing gear. Four speeds and reverse are given, with direct drive on the top gear. Two sliding members are provided in the gear box, the primary shaft being divided in the usual fashion and locked by dog clutches to secure the direct drive. This, of course, necessitates the adoption of the gate system of change speed gear. All gear shafts run on ball-bearings and are on the same plane. The cardan shaft transmission is of the usual

type, the live axle casing being split vertically. A pedal brake is fitted on the forward end of the cardan shaft outside the gearbox, and two substantial torque rods are fitted from side members of frame to ends of the live axle casing. Lubrication is pressure-fed from an oil tank situated outside the right frame member. Full steering control is given on the Mercedes plan. The cardan shaft brake is of the usual contracting type, but the hand-applied brakes on rear wheel hubs are metal-to-metal, with internal expanding blocks. The body suspension is of a luxurious type, three long laminated springs being combined behind with two on the front axle. The wheel base is 8 feet 2 inches, and the wheel gauge about 4 feet 6 inches.

M. & W. PLANT PROGRESSING

Detroit, Mich., Feb. 3—The new plant of Morgan & Wright is rapidly nearing completion and the constructors are making a record for quick construction. The new plant is in the rear of the old street car barns on Jefferson avenue. The buildings were all constructed on made ground, every foot of the foundations being built upon piles. June 23, 1905, was the date of the driving of the first pile, but it was not until August 17 that the concreting for the foundations was started. Now the huge plant is so far along in construction that it is expected that operations in at least a part of it will be commenced by the middle of April. Mechanical Superintendent V. B. Lang says that, at the present rate of progress, the entire plant will be completed and doing business early in June of this year. Thus the gigantic plant will have been completed within 1 year from the time the first sod was turned. The three largest buildings of the plant are now under roof and practically completed. These are the mill building, 60 by 300 feet, and the manufactured goods building, with the same dimensions. Both buildings are five stories high. The power house, 114 by 153 feet, is also practically completed. The cement house, 59 by 95, is completed; one story of the 87 by 153 machine shop is up and the foundations of the 60 by 250 warehouse are done. The steel frame of this building is also up.

NAPIER IN GRAND PRIX

Paris, Jan. 25—For the Sarthe race of the French A. C. only two Napier cars will be run, which will be piloted by Clifford Earp and Macdonald. The Mercedes people are also experimenting with a six-cylinder car of 130 horsepower at their works at Unterturckhelm. As an outcome of the formation of this race, a club has been created at Le Mans, 150 members joining on the spot with a hundred more names promised within the next 2 weeks. Interest of a wide character has as if by magic sprung up of late and is increasing daily.

NEW KIND OF TROUBLE

Megargel Gets Rid of Snow but Finds No Bridges to Cross in New Mexico

Gallup, N. M., Feb. 3—The snow has entirely disappeared in the lowlands and the depth of the numerous streams we have to ford has diminished to a considerable extent, yet motoring through New Mexico still presents more hardships and difficulties than it has ever been my lot to contend with. Thus far we have not encountered a single bridge in the territory. Every stream, great or small, has to be forded and with their treacherous bottoms concealed by from 6 inches to 3 feet of water, it is always a gamble whether we will reach the opposite bank or not.

Our cable has been in constant use all the past week and we have been using strips of canvas under the wheels to give us traction in the mud at the bottoms of the arroyos we have been continually crossing. Friendly Indians have helped us upon numerous occasions. The ground is pretty hard at daylight and for 2 or 3 hours after sun-up, then it commences to thaw out and by noon the mud is almost hub deep.

The soil through this section is of that soft adobe mud that clings to the wheels and to the soles of your shoes until it weighs several pounds. It packs in solid between the spokes of the wheels, between the wheels and the mud guards and between the rear wheels and the body of the Reo Mountaineer, making wheeling most difficult.

The Reo is the first vehicle of any kind that has been over the trail since last fall and we frequently come to the bank of an arroyo that has to be forded, and find the bank almost perpendicular. In cases of this kind hours are lost trying to locate a place up or down the ravine where we can get our car over. If we fail to find such a place there is nothing to do but take our shovel, axe and crowbar and build a road down the clay bank and up the opposite side, sometimes an entire day's work.

We have been running without a guide for the past week and several times have lost our way. On Thursday we were told to follow the road running directly south from the railroad tracks until we had rounded the rocky hills to the north. We found a well beaten trail and thinking, of course, it was the one we wanted, followed it mile after mile, only to run into a Navajo Indian village of considerable size, many miles out of our course.

Navajos crowded around our little car asking us all kinds of questions in the Indian language which, naturally, we did not understand. By mentioning the name of the town we were looking for and pointing to all four points of the compass, we managed to make them understand and they then directed us, talking in the sign language, which we could understand. The Indian village was the largest we have yet come across and was composed of probably two dozen mud houses, one of logs, and several wigwams. All the Indians were loaded down with silver ornaments and several wagons and countless Indian ponies showed the village to be a prosperous one from an Indian standpoint.

Some of the ravines or arroyos that we have crossed would cause an eastern automobilist to open his eyes pretty wide. In fact, we have become so accustomed to this kind of thing that after wading around in the creek bottom to make sure the quicksand is not too dangerous, we, without hesitation, descend with our engine running at full speed, throw in the low clutch at the bottom and go as far up the opposite bank as possible, allowing the engine to die with the clutch still in. We then plant a post at the top of the embankment, attach our steel cable, and with one man working windlass and the other working engine, we have always managed to make the top, no matter how steep the embankment. Once or twice we have pulled out the stake at the top of the arroyo when the car has been almost to the top. The automobile would then back down to the bottom and we would have our work to do all over again, not any too joyous a task.

We have to depend largely upon our own food supply, as the majority of the section houses through New Mexico are kept by Mexican section bosses, and they invariably refuse to feed or lodge strangers. Of course there are exceptions to this rule, but when the house is kept by Mexicans a refusal can generally be looked for. The Indians are more accommodating, but neither Fassett nor myself can accustom ourselves to Indian stew, which may or may not be composed of dog meat. The majority of both Navajos and Apaches prefer horse meat to beef, and ponies are cheaper, but I can't get accustomed to it somehow, despite a good appetite.—PERCY F. MEGARGEL.

SOAKERS ARE SOAKED

Philadelphia, Feb. 3—Local automobilists who were mulcted in the sum of over $3,000 last year in Springfield and Cheltenham townships, Montgomery county, for infractions of the local speed laws are chuckling over the trouble the authorities have got into as a consequence. It was decided to use the fine money for road improvement, and work was at once started on the widening of Church road, a favorite thoroughfare for motor cars. But the estimates were all astray, and instead of completing the improvements for about $3,500 the county and townships have already paid $6,000, and a kick by some of the abutting property owners the other day netted them $700 more.

SHOW ON IN CAPITAL

Society Turns Out for First Night of Automobile Exhibition—Is Called Trade Booster

Washington, D. C., Feb. 5—If any one had any doubts as to whether the national capital is automobile crazy a visit to the automobile show, which opened tonight in the Light Infantry armory, would have dispelled them. The crowd came early and stayed late, and such a crowd it was, too. Touching elbows with the plain people were members of the diplomatic corps, army and navy officers, members of congress, and many others who go to make up official and social Washington. All these people are deeply interested in the automobile game and are falling over themselves in their efforts to get their orders in early so they may have their cars ready when the season opens. The show promoters, who constitute the membership of the Washington Automobile Dealers' Association, made a ten-strike when they secured such an early date for their show, for they are enabled to get in touch with prospective buyers before the season opens and have plenty of time to do missionary work. The show is a howling success if the splendid crowd on the inaugural night can be taken as a criterion. The weather is all that could be desired, the air being just crisp enough to be pleasant. The streets and the park roads are in good condition and the demonstration cars, of which every exhibitor has from two to seven, can do good work. Demonstrations this year are all by appointment, and the free-ride grafters will not be able to get in their fine work, as has been the case in former years.

Better taste was displayed in decorating the armory this year than ever before. The scene is very pleasing to the eye and reffects credit on those who had to do with this work.

Late tonight MOTOR AGE'S representative made a round of the show to find out the sentiment of the exhibitors as to the possibilities for sales. Without a single exception they expressed the opinion that the show would be a potent factor in effecting sales. Many sales were made tonight and many more are on the point of consummation. In a word, the show now in progress is "the best trade booster that has ever happened," to quote an enthusiastic exhibitor.

For the first time in the history of Washington shows, the Automobile Club of Washington is a participant. The club has quarters in a large room just off the main floor, where lots of good fellows congregated tonight and talked over their experiences. A buffet lunch is served each evening and many recruits were secured.

The list of exhibitors is as follows: National Automobile Co., Packard, Thomas, Studebaker, Oldsmobile and Buick; Southern Automobile Co., Pierce Arrow; Pope Mfg. Co., the full Pope line; Cook & Stoddard Co., Locomobile, White, Cadillac, Franklin and Baker; Washington Electric Vehicle & Transportation Co., Columbia gasoline and electrics; Electric Storage Battery Co., Exide batteries; National Electric Supply Co., Michelin, Harburg and Samson tires, Rushmore and Solar lamps, Gabriel horns, Foster shock absorbers; Rose Mfg. Co., Neverout lamps; Haughton Automobile Co., Gale and Premier; Rudolph, West & Co., supplies; S. J. Meeks' Sons, Lambert; Willard Automobile Co., Jackson and Dolson and Swinehart tires; H. A. Rhine & Co., Haynes and Auburn; W. C. Robinson & Co., lubricants; Thomas & Helbert, Maxwell; Commercial Automobile & Supply Co., Wayne, Logan and DeMars' electrics; Reo Motor Car Agency, Reo; Motor Car Co., Peerless and Stevens-Duryea; Charles E. Miller & Brother, Ford, Columbus electrics and Indian motorcycles; Voorhees Rubber Mfg. Co., Voorhees tires; Automobile Tire & Repair Works, Hercules tires; Truscott Boat Mfg. Co., motor boats and engines.

FRENCH TOUR DETAILS

Paris, Jan. 25—Marquis de Dion has returned from a trip to Berlin in the interests of the French A. C. The so-called European circuit affecting so many national interests, it is not surprising that difficulties were raised all round. The Austrians insisted that the race should pass through Budapest. The Germans wished to see Silesia included. The tact of the Marquis de Dion has smoothed several difficulties and among other innovations regarding the race are the following: Repairs are penalized one point per minute, tire repairs not counting, but in order to limit the speed as per regulations the competitor will have his total time and running time added to the penalizations plus tire repairs. This tour which is looked upon here as a good advertisement for French makes, may certainly be classed as the most important of 1906. It will include 21 days' travel, of which 6 may be called exhibition days in such important centers as Milan, Vienna, Berlin and Cologne. The total distance is some 3,125 miles.

A. C. A. ENDURANCE RUN

New York, Feb. 3—The Automobile Club of America is stated to be planning an economy and endurance run for the spring and, it is said, will place the management of the affair in the hands of a special committee of seven to be appointed at an early date. The run, it is said, will occupy the greater part of a week. The New York Motor Club is planning to put into execution the plans for the second national economy run. It is clear that there will be no dearth of popular events of this kind during the coming season. The Glidden tour plans are said to be well under way at the present time.

STIRRED BY THE BILL

Jerseyites in Arms Against Frelinghuysen Measure, Preferring Jackson Amendment

New York, Feb. 5—Automobile legislation in New Jersey is engrossing the attention of local motorists and many motor-car owners throughout the United States. The hearing on the Frelinghuysen bill is set for Wednesday, and large numbers of prominent motorists are preparing to descend on Trenton to attempt to argue the rural legislators into something having the semblance of reason. Another bill which has been put forward as an alternative measure, but not by the motorists, seems to promise well. This is a bill which had its initiative on the part of the state board of agriculture, the state horticultural society and the State Road Protectors' Association, and it has been introduced in the assembly by Assemblyman Jackson. The Jackson measure is more reasonable than the Frelinghuysen bill, as it recognizes the fact that automobiles should be taxed, not for revenue, but for purposes of identification by license tags. It does away with the heavy horsepower tax feature of the Frelinghuysen measure and treats the motor car as a necessary evil rather than a nuisance. The Jackson bill, however, is as one with the more obnoxious measure in the contention that arrests should be made without corroborative evidence. The backers of the bill take the stand that many offending motorists get away because of the provision of the existing law that the constable making the arrest must produce eye-witnesses to the infringement of the speed regulations.

Letters of protest are being sent to the New Jersey committeemen by the hundreds from all parts of New Jersey and from New York. The New Jersey clubs are sending circulars to all automobilists and are moving heaven and earth to prevent the passage of the hostile legislation. The daily press is filled with protests from owners of automobiles in New Jersey and contiguous territory, who are threatened with having to sell their machines under the workings of a law which makes their operation an exceedingly expensive luxury.

This being the open season for automobile legislation, Senator l'Hommedieu, of New York state, is taking the annual hack at the motorists. His bill, recently introduced, calls for the statement by the owner, when registering his automobile, of the horsepower of his machine and a tax based on this statement of $1 per horsepower. The average machine registered is from 20 to 25 horsepower, and the automobilists of the state are not prepared to pay any such amount for their yearly license, even if the money is to be applied to the preservation of the state roads through the office of the state engineer. This latter clause has the hearty co-opera-

tion of the automobilists of the state.

The New York State Association of Automobile Clubs has got busy during the last few days and has suggested a new system of taxation which, it is claimed, will meet the requirements and be satisfactory to all automobilists. They suggest a taxation by weight, 10 cents per hundred pounds being suggested. This would bring the license fee for a 2,000-pound machine to $2 yearly, and on the basis of the registrations—now about 25,000—would give a revenue for road renewal of something in the neighborhood of $50,000. It is further pointed out that the registrations increase at the rate of about 10,000 per year and the fund is likely to grow into considerable proportions before the year closes. A hearing by the state senate committee on taxation is promised at an early date, but no day has yet been set for it.

CARS AT FRENCH INAUGURAL

Paris, Jan. 26—The extent to which automobiles have entered into French life and politics may be gauged from the appearance of the Versailles roads and the palace court on the president's election the other day. Seven years ago on the occasion of the election of President Loubet the automobile was a curious object of attention by the crowds and in fact rather encouraged ridicule. In the palace court it was conspicuous by its absence, for the police carefully weeded out the automobile turnouts from the precincts as liable to create disorder. Now, however, all is changed, for out of 600 odd senators between 300 and 400 proceeded to Versailles in their luxuriously appointed cars. Inside the palace court they were drawn up to right and to left like so many pieces of artillery. The exit of the newly-elected president, Fallieres, was the signal for a hooting of horns on the assembled automobiles. And, although the president himself proceeded slowly through the streets behind a pair of splendid bays, it was an incongruous sight not unremarked by the assembled spectators. One thing is certain, the next French president will not consider himself duly elected unless he proceeds to Versailles and returns therefrom in the up-to-date conveyance, the motor car.

VANDERBILT CAR TUNED UP

New York, Feb. 6—The 250-horsepower car built by Francois Richard and Paul Sartori to the order of Alfred Gwynne Vanderbilt, which failed to run at Ormond, is said to have been coaxed into condition, and there is a report that the owner has applied for a permit to time the car for a mile on the Atlantic beach, near Jacksonville, in an effort to lower the 28⅕-second mile made by the Stanley steamer. According to members of the racing board of the American Automobile can be done, as the car is said to be overweight.

RACERS NOW IN CUBA

Circuit Chasers Reach Havanna and are Given Welcome—Entries for the Race

Havana, Feb. 6—Special cablegram—Lancia, Cedrino and Demogoot, with their respective cars, accompanied by a bunch of twenty circuit chasers and newspaper men, sailed past Moro Castle into Havana harbor yesterday, while Maurice Bernin arrived today with his Renault racing machine. The crowd was met by a large reception committee, which boarded a tug and met the steamer. An enthusiastic reception was tendered the visitors, the Havana papers devoting columns of space to the foreign drivers in particular and everybody and everything in general.

The visitors are inspecting the road race course today and the number of machines out on the road is large. There has been a large increase in the number of automobiles in use in Havana since last year, the total now being fully 200. The race starts at Camp Columbia Sunday morning at 8 o'clock and already every available motor car in the district has been engaged for the day, and the roads leading to the course will swarm with automobiles, secured at exorbitant figures, as the Havanese are becoming deeply interested in the game.

The starters in the race will be Lancia, Cedrino, Demogoot, Bernin and, possibly, several others who will drive high-power touring cars. The circuit chasers saw jaialia last night, with most satisfactory results, most of them being winners. The newspaper bunch is installed on the roof of the Telegrafo hotel, among the number being C. H. Tangeman, Nathan Lazarnick, John C. Wetmore, John C. Kerrison, F. E. Spooner, Fields of the Brooklyn Eagle and Harrison of the New York Tribune. All are delighted with Havana, the weather being clear and warm. The new hands like the place and, of course, those who visited here last year are only too glad to return. In all probability the circuit chasers will visit Jamaica before they leave for home, to inspect the proposed road race course, which is pronounced one of the finest highways in the world. So much has been said about this grand highway that one member of the American party has taken himself seriously and suggests running the Vanderbilt in Jamaica.

MEETINGS OF SHOW WEEK

Chicago, Feb. 7—The executive committee of the National Association of Automobile Manufacturers met this morning at the First regiment armory. Only routine business was transacted, it was announced after the session, and the directors had nothing to give out to the public.

The American Automobile Association will elect its 1906 officers tomorrow, the following ticket having been made up by the nominating committe: President, John Farson, Chicago Automobile Club; first vice-president, William M. Hotchkiss, Buffalo Automobile Club; second vice-president, Dr. Milbank Johnson, Automobile Club of Southern California; third vice-president, L. R. Speare, Boston; treasurer, G. E. Farrington, Automobile Club of New Jersey. Secretary Batchelder's successor has not been settled, although S. S. Gorham, of Chicago, is talked of. Neither has anyone been found to relieve R. L. Morrell of his duties as chairman of the racing board. The A. A. A. now represents 7,000 motorists.

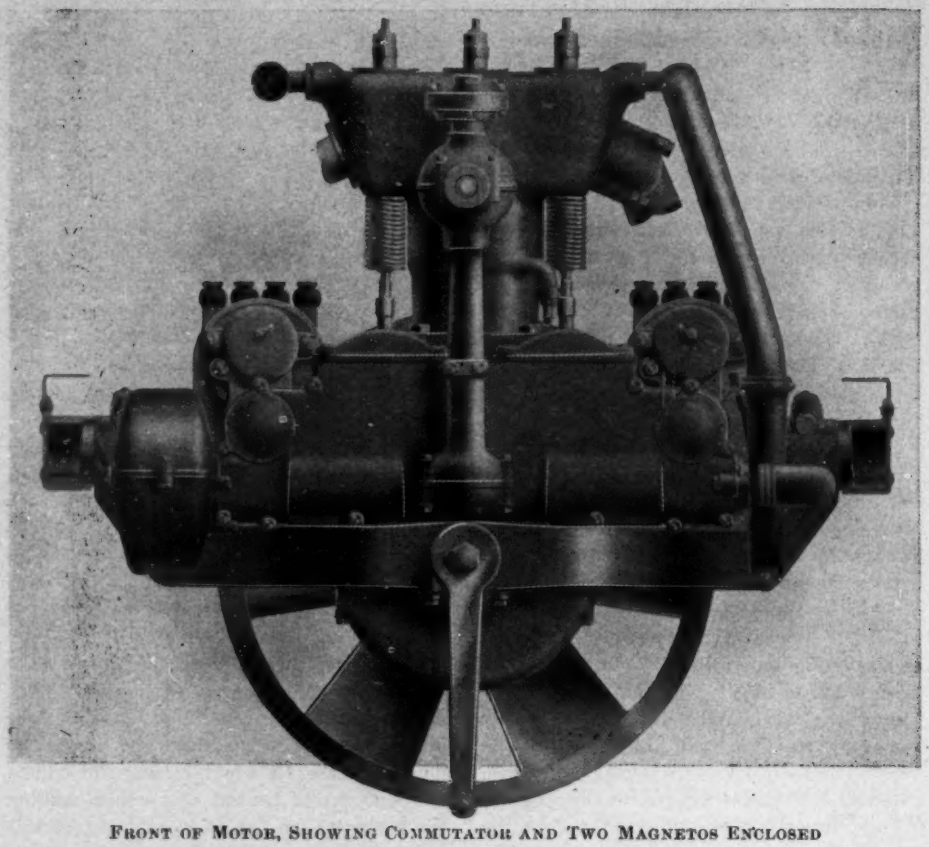
AERO CLUB HOLDS TEST.

New York, Feb. 6—The first experiment by the Aero Club of America has been held. The club has been utilizing the gas plant at West Point as a base of operations, the government officers at that post being specially interested in the work of the club. On Sunday afternoon the first pilot balloon was sent up at West Point, and yesterday it was returned from Glen Head, L. I., by express. The test balloon sent up Sunday has a diameter of about 10 feet and holds 250 cubic feet of gas. The lifting power of the gas was found to be about 40 pounds to the 1,000 cubic feet. The little balloon carried ballast and a note asking the finder to express it to the Automobile Club of America, the New York headquarters of the Aero Club, a reward of $5 being offered for the faithful performance of this duty. The landing of the balloon in Glen Head shows that it traveled somewhere between 75 and 90 miles. Leo Stevens, who built the balloon, was in charge of the ascension. The balloon was sent up to test the conditions before the ascent of a large balloon containing 22,000 feet of gas, which is soon to be made. Two other pilot balloons were sent up on Saturday afternoon from the club headquarters in the borough of the Bronx, but neither of these has been heard from. It is now stated that the ascension of the larger balloon will be made from Tuxedo, N. J., in the near future.

QUAKER SHOW PLANS

Philadelphia, Feb. 5—Although the local automobile show will not open its doors to the public until the 24th, howls as to the inadequate space are already rising from disappointed applicants who put off their bids till the ninth hour—and this despite the fact that the floor space at the committee's disposal is considerably over twice that available at last year's show in the First regiment armory. Even the score or more small spaces improvised on the upper floor of the national export exposition building—and which were originally designed for committee rooms—were snapped up long ago, and corridors and passageways are about all that remain for the unfortunates who failed to get in on the ground floor.

NEW MOORE CAR IS CALLED A MARVEL



FRONT OF MOTOR, SHOWING COMMUTATOR AND TWO MAGNETOS ENCLOSED

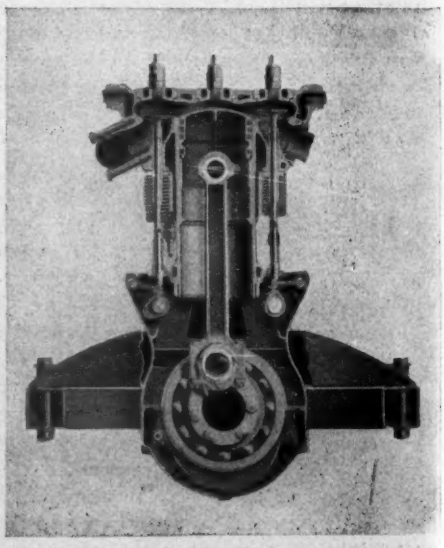
All Rotating Parts, Save One, Fitted with Ball Bearings—Features Entirely New Both at Home and Abroad

TO THE knowing who have kept in more than ordinary close touch with the cars now making their initial bow there was disappointment in that the Moore car did not make its appearance at either the New York or Chicago shows. A number of these cars are now being built and so exact have been the makers that delays have come in securing the quality of material used throughout the construction, thus causing delays in the shop that completing even one of the cars in time was found impossible by the Moore Automobile Co., of New York. Every part of the new car shows exquisite workmanship. Chrome nickel steel is used for every moving or rotating part except the flywheel and piston and even these are of special analysis; iron being used for the piston, gun iron for the rings and best steel for the flywheel. Every rotating shaft except the crankpins at the big ends of the connecting rods, runs on ball bearings, there being sixty of these bearings in the car, including the five on the crankshaft of the engine and the two in the magnetos, reducing the inherent friction of the driving mechanism to a minimum. The general use of ball bearings also reduces the lubrication problem to a simple form, the only part needing a constant feed being the crankcase to take care of the waste from carbonizing. All parts are interchangeable and finished to standard sizes with an allowance of not more than .001 to .002 of an inch. The company has interesting tabulation of material and where used showing the tensile strength in pounds, the elastic limit in pounds, the elongation and percent reduction area.

Each of the cylinders is cast separately, without water-jackets and turned outside as well as inside. The inside allowance is .001-inch and the cylinders are round within, .0005-inch. The waterjackets are of copper, electrically deposited, the copper deposit being carried from the lowest point of the waterjacket down to the lower end of the cylinder. This construction gives an engine that is lighter and shorter than where the waterjacket wall is cast with the cylinder, afford easy repair by soldering or brazing in case of puncture and means an engine cylinder easily cleaned, as the entire jacket is polished before assembling on the crank case. The cooling water enters the jacket immediately around the exhaust valve and then passes around the sides and across the top of the cylinder to its out-going point near the inlet valve. With the turned outside cylinder wall and the copper jacket as well as the copper water system throughout, there is an assurance of clean water free from oxide deposit. The pistons are crowned at their tops. They are fitted with four rings and below the bottom ring is a recess cut in the piston to wipe off any oil into the center of the hollow wrist-pin bearing rather than permitting it to pass into the explosion chamber to carbonize or soot the plugs and to cause that smoky exhaust so familiar with many engines. The wrist-pins are hollow, are hardened and ground and have more than the usual bearing surfaces because of the construction at that point. Each piston has two long, inwardly extending bosses in which the wrist-pin turns, the latter being pinned to the connecting rod. This construction is used as it is believed that lubrication is more assured from the sweeping of the cylinder wall and, further, that being nearer the jacket walls there is a greater tendency to give off heat to prevent seizing. It is obvious that this method gives the widest possible arc of support to the thrust at the initial expansion moment.

Like all other parts of their character the connecting rods are made of chrome nickel steel, oil tempered and annealed. They are of I-section. The lower end of each connecting rod has a spherical bearing on the upper half of the crankpin brass to allow for self adjustment from any slight misalignment, insuring the brasses always bearing uniformly on the crankpin for its entire length. The lower half of the crankpin brass is made integral with the cap itself and is bolted to the connecting rod with the usual bolts and castellated nuts. This lower cap only extends for about one-half the length of the crankpin so that at each revolution of the crank the uncovered portion of the crankpin dips into the oil in the bottom of the crankcase or is splashed by it over the crankpin. In addition, the bottom brass has two finger scoops which descend close to the bottom of the case. The brasses are slightly recessed at this point to prevent pinching the crankpin and to allow a sidewise distribution of the oil.

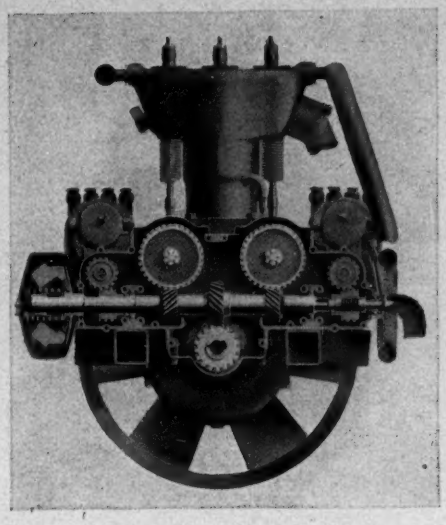
The crankshaft is of special construc-



CROSS SECTION OF CYLINDER

tion to adapt it to the introduction of separate ball bearings between the cylinders and at each end. It is built up of a series of individual U-shaped cranks of identical construction, turned from the solid and bolted together and provided with a series of collars for the ball raceways. The front end section is extended, reduced in diameter, to take a spiral gear for driving two camshafts and the rear end section is arranged for the flywheel, with fan blades, and the clutch cone and springs. Both crankpin and ball raceway bearings are made hollow to reduce weight. The five ball bearings in which the shaft revolves are bolted by caps to the upper crankcase of managanese bronze, and are accessible by removing the lower crankcase of aluminum. Notwithstanding the adoption of separate cylinders and three ball bearings between the cylinders and the two end ball bearings, the engine is shorter and more compact than many hitherto designed, with cylinders cast in pairs and having only three plain bearings. The ball bearings in the engine and throughout the machine are of Hess-Bright make. The crankpins are integral with and form a part of the individual sections of the crank. The upper crankcase is made of manganese bronze, as aluminum is not considered a suitable metal to support the cylinders as well as to provide seats for the ball bearings of the crankshaft. The lower case, acting merely as a case for holding the oil for lubrication, carrying no load or strain, is made of aluminum. It is divided into four compartments to prevent surging of the oil and to thus insure each crankpin having a proper oil supply. A proper level of oil is also maintained by a feature in connection with the upper half of the crankcase that is described in reference to lubrication. A standpipe and suitable drain plugs are also part of the lower crankcase design.

Inlet and exhaust valves are made of special high percentage nickel steel. They are mechanically operated by two camshafts on opposite sides of the engine and are interchangeable. The valve springs are supported at their lower ends by a plate held in place with Woodruff keys. The floating valve stems, or striker rods, are encased in covers screwed into the camshaft casings and held against the lifter by small helicol springs. Necked thimbles surround these covers hooding in and moving with the floating stems. Between the tops of the stems and the tops of the thimbles are numbers of thin spring steel washers that can be removed to insure exact timing as the valves are lowered by grinding. Each camshaft and its cams are made in one piece, turned from the solid, the cams being drawn after the whole is tempered. The shafts run in ball bearings and are oiled by splash from the crankcase. They are driven by a cross shaft, in the front of the engine, from the crankshaft by two



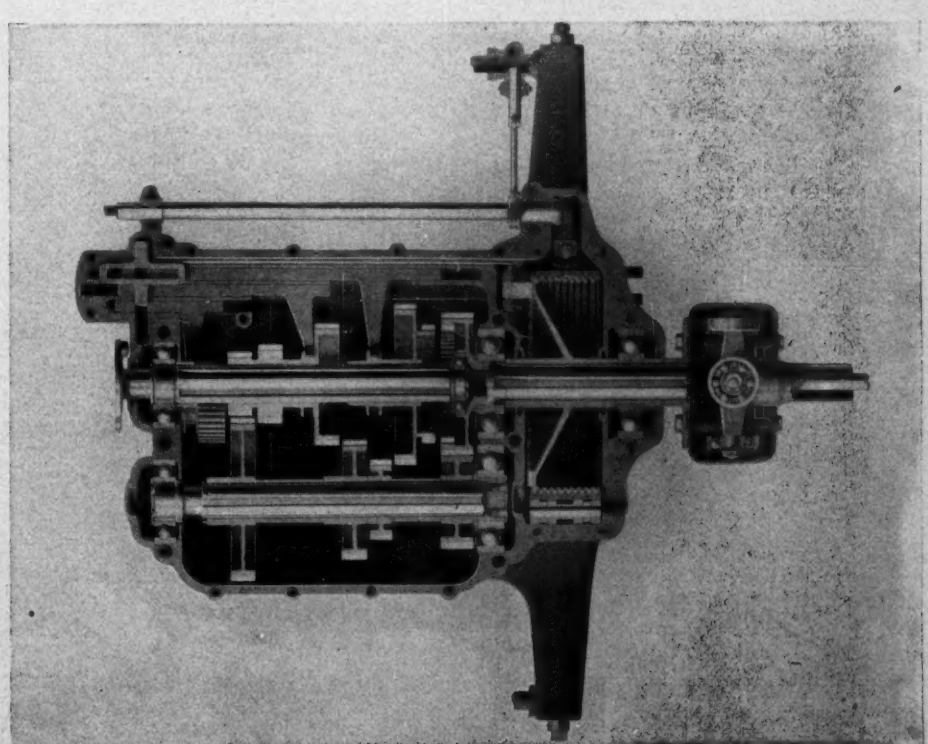
FRONT VIEW, SHOWING TIME SHAFT

spiral gears. They are encased within the crankcase to insure cleanliness and lubrication. End thrust of the cross-shaft is counterbalanced by running the camshafts in opposite directions.

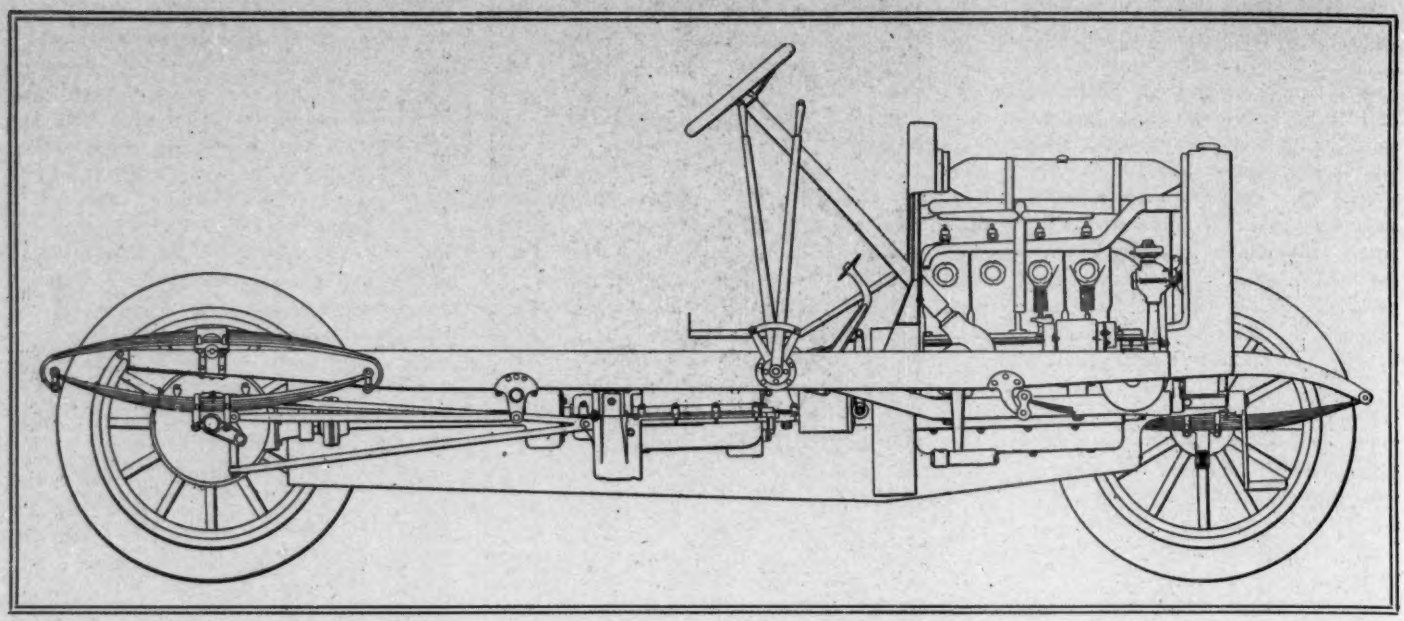
All parts of the engine are oiled by splash, the supply being contained in a round tank, with coned ends, placed over the motor and under the hood and passing through a gravity sight feed on the dash, with an indicator to show the oil level in the tank. Two inclined troughs are cast on the side walls of the upper section of the crankcase, one sloping toward the back and the other toward the front so that in ascending or descending a hill the highest cylinder pit is insured a good supply of oil. Any surplus oil surging against the front wall of the crankcase is drained to the spiral gears driving the camshafts, magnetos and pan and then back to the bottom of the crankcase chambers.

Water circulation is maintained by a centrifugal pump running on a ball bearing and attached to the end of the hollow cross-shaft which drives the camshafts. It can be entirely removed by taking out two bracket bolts holding it in the crankcase. By unscrewing a single nut the cover can be taken off and the pump runner removed. The water connections are copper pipes in all instances, graduated in size proportionate to the quantity of water passing through them and with easy bends to reduce to a minimum the work on the pumps. Both inlet and outlet pipes are attached to the cylinders with screw flanges. Rubber connections and a strainer are also used in connection. The cylinder jackets are connected by copper drain pipes, the forward cylinder drain pipe leading into a drain pipe from the radiator. Into this leads a drain from the pump case and from a waterjacket pipe from the shaft brake case. By opening a single cock the entire system can be drained. A connection is also made from the back end of this pipe to a circulation gauge on the dash of the car.

A triple system of jump spark ignition is provided, from two high tension magnetos and a coil—one magneto is located on each side of the engine and driven by spiral gears from the forward cross-shaft that drives the camshafts. The magnetos are supported by brackets cast on the upper crankcase. These brackets have grooves on the upper side matching grooves on the under side of the magnetos, for alignment. The end of the magneto shaft is provided with a slot engaging the spiral gear, thus making removal merely a matter of taking out four bolts. This slot is so arranged that it can only engage in one position, thus insuring that highly im-



TOP VIEW SECTION GEAR CASE, SHOWING BRAKE ON SHAFT



RIGHT SIDE VIEW OF CHASSIS, WITH FRONT AND REAR AXLES IN SECTION

portant need that the magnetos are always in proper time. Ordinarily the two magnetos work together and each is provided with a separate set of spark plugs, one set placed over the inlet valves and the other over the center of the cylinders or over the exhaust valves. In addition to the above a coil and storage battery are equipped, for starting, etc. The commutator for this system is located at the top of a column, at the front center of the engine, driven from the cross-shaft. This column also drives the radiator fan. The plugs for this system are placed over the center of the cylinders or over the exhaust valves. All plugs screw into screw caps, the two side caps being removable for taking out the valves and the center for getting at the cylinder for cleaning. There may, therefore, be three distinct and separate sparks in each cylinder, insuring a rapid propagation through the mixture for maximum power. It is also obvious that any trouble with any two of the systems cannot put the car out of running.

The advance of the spark in all systems is automatically controlled by a governor on one end of the cross-shaft. The spiral pinions which engage the gears on the magneto shafts are made with an extra wide face and slide on a feather on the hollow cross-shaft. Through this shaft the gears are connected as a unit. The governor is connected with these gears and as the speed of the engine changes these slide forward or backward on the feather, causing an automatic advance or retardation of the spark. A similar connection is made to the commutator, giving all the same timing. The governor spring is of special construction to cause a rapid advance at low speeds and a gradual retardation as the engine speed increases. This is a noteworthy feature, as many attempts in this direction heretofore have been directly proportionate to the increase of engine speed. The magnetos and commutator are also interconnected so that the advance and retardation of the spark can be effected from the steering wheel. All high tension wires are enclosed in copper tubes and contacts with the spark plugs are by knife switches. The low tension wires are also enclosed in a copper tube and are led to the bottom of the steering post and connected with the key switch. The clutch is of the metal-to-metal type, self contained within the hub of the flywheel, enclosed and running in an oil bath. The clutch proper consists of a double cone disk very thin and light, made possible by the use of chrome nickel steel, hardened and ground. This engages exteriorly a hardened steel bushing set into the flywheel. An expanding steel ring set out by a cam or lever, engages the clutch on the inside, expanding the clutch cone hard against the steel bushing in the flywheel and slightly expanding the cone clutch against it. In disengaging the clutch the action is to mechanically compress the internal expanding ring by sliding it up a slight incline, thus positively relieving the clutch to prevent its getting bound, a sometime fault with metallic clutches. All contact surfaces run in an oil bath which has to be pressed out before the final positive grip takes place. The clutch case is connected through the hollow crankshaft with the crankcase, for its oil supply. The clutch is held up by a double hellical spring completely enclosed in grease, the end thrust being taken up by a ball bearing supported at the rear end by a ball bearing revolving on the engine tail shaft.

The clutch disengaging fork has two ball bearings with conical contact surfaces rolling upon a similar conical surface on the clutch cover. A double universal and sliding joint, completely enclosed and packed in grease, is placed between the engine and transmission case to provide for any twisting of the frame or misalignment of the mechanism. In fact, in assembling these they could be put considerably out of line without in any way effecting the working of the drive. The clutch shaft slides upon the sliding joint within the universal.

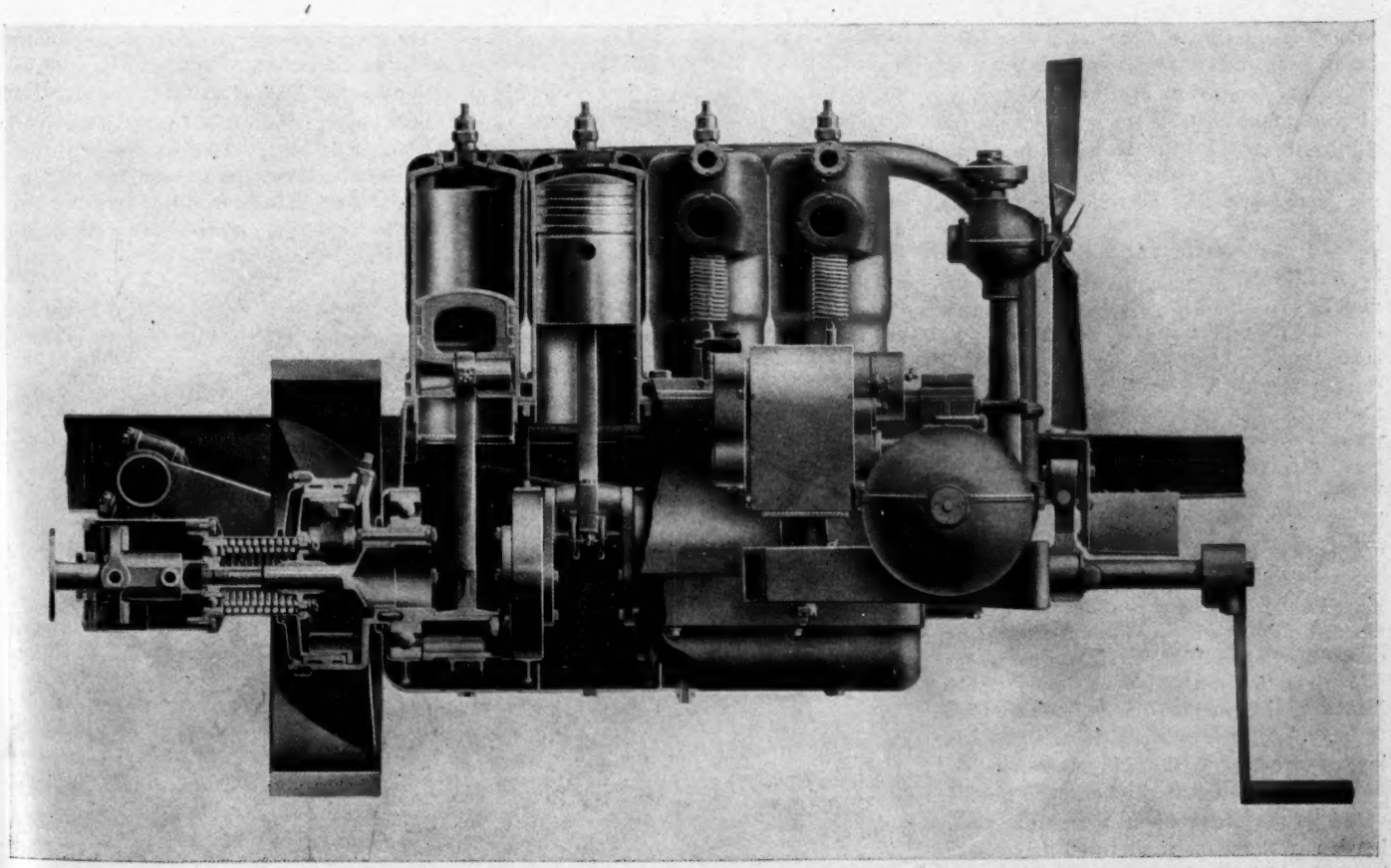
The transmission case is of manganese bronze, with an inspection cover at the top and a drain plug at the bottom. The gears are cut from the solid, which is a special analysis chrome nickel steel having the high tensile strength of 220,000 pounds to the square inch and an elastic limit of 130,000 pounds per square inch. The two sets of sliding gears for the different changes of speed slide on the main shaft in a sextuple feather, the claim for this being that less wear is possible than where a squared shaft is fitted. The gears are brought into mesh by three sliding rods entirely enclosed in the transmission case with no protruding ends to leak oil. The fixed gears on the countershaft are also fitted to a sextuple feather and are positively held in place against shoulders by intermediate spacing sleeves instead of by bolts. In order to remove the gears it is only necessary to lift out the shaft and slide off the gears. Ball bearings are fitted throughout, partitioned from the main case to protect them from any chipped particles from the gears. Four speeds and a reverse are obtained, worked through a gate quadrant, which is coming into wider use each year, as it entirely prevents overrunning or missing a gear. The direct drive is on the third gear. On the fourth drive the speed of the rear shaft is, therefore, accelerated above that of the engine. Incidentally, this construction reduces the size of the gears. The change speed lever is provided with a button on top to prevent going into reverse. All other changes of speed are made by simply pulling or pushing the lever. Stripping of the gears is prevented by an interlocking device which necessitates the clutch being completely withdrawn before the hand lever can be moved

and which allows the clutch to be put into engagement as soon as the gears are in mesh.

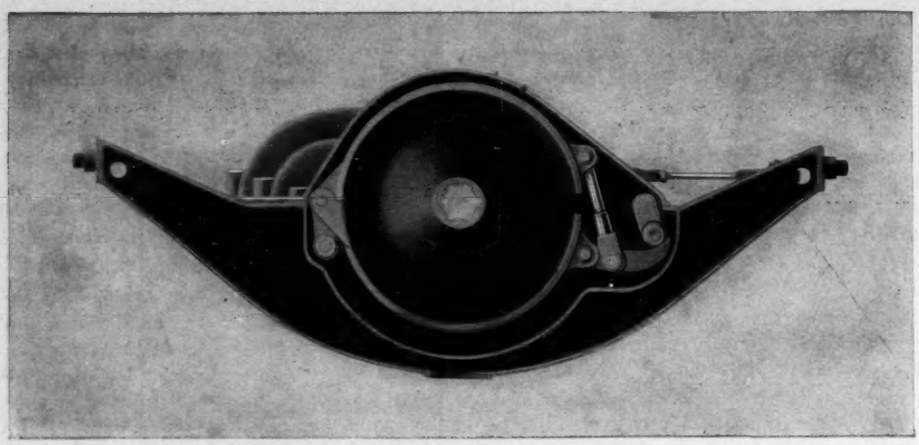
In a rear extension of the transmission case is enclosed the brake drum, on the propeller shaft, mounted between two ball bearings. A large gripping surface is obtained by cutting V grooves in the drum face matching like grooves in the brake band. Running in an oil bath, the drum is kept cool by a water passage, under the oil bath, that is part of the water pump circulation. The flow of the water is controlled by a valve, operated by a shaft connected to the brake pedal, opening when the brake is applied and closing when the pedal is released. The propeller shaft, of chrome nickel steel, spring tempered, has a compound action. It is a shaft within a shaft, being a solid rod inside a tube, concentric with each other. It is not made up of a rod and a tube but has the annular space turned from the solid. That is, at one end the tube and solid are part and parcel with that end, the other end presenting the annular space that extends nearly the entire length of the compound shaft. The solid end is at the front with a universal joint, having a sliding universal connection mounted on ball bearings. At the back end the solid section of the shaft is fixedly connected to a universal while the tubular section ends in a maltese cross that mates a similar cross on the forward member of the solid axle universal. These two crosses are not a snug male and female fit but have a difference of 22½ degrees in their faces. This construction allows for a certain amount of twisting or torsion between the transmission case and the rear axle so that any sudden load change is not rigidly transmitted to the mechanism, forward or backward, the solid axle acting as an elastic member. But before the load becomes as great as to overstrain the internal shaft the external hollow member takes up the lead. There is always a torsinal tension in the shaft and there can be no considerable shock until this is all absorbed and the direction of torque reversed. The claim made for this drive, that it gives to large powered cars a shaft drive with all the flexibility heretofore exclusively claimed for the double-chain drive, seems well founded. This being so, it does away with the uncleanliness of the chain and restores the flexibility that the side chain drive is losing by virtue of the short chains made necessary with side entrance bodies.

The main bevel gear and pinion and the differential, of the spur gear type, are located in a spherical case in the middle of the rear axle and are mounted upon a separate and independent shaft with ball bearings and ball thrust. The main bevel gear shaft has a multiple interior feather cut in it in which engages the two-part drive shaft, the outer ends of which engage with the wheels through forked spiders to drive the wheels. By removing the lock nuts and caps on the wheels these axles can be pulled right out. The supporting or casing axle is of double conical hollow construction. The wheels run on ball bearings forced onto hardened steel sleeves which fit the axles and upon which they can turn in the event of a temporary disarrangement of the ball bearings. This construction has the advantage that the removal of the wheels, to examine the brakes, etc., does not disturb the ball bearings as the wheel and sleeve come off as a unit. The front axle is of I-section. The steering knuckles have ball thrust and double ball bearings for rotating, thus insuring easy turning of the hand wheel and making steering easy even in fast running. The equalizer rod is back of the front axle. The rear emergency brakes are of the internal expanding type. They are operated by toggle joints, connected to levers and short shafts just under and slightly in front of the rear axle, and are attached inside the frame to an equalizing bar connecting the brakes from either wheel. The connection from the equalizing bar to the right pedal and also to the lever is directly from the center. This construction is designed to prevent skidding caused when one brake grips more than another owing to unequal tension of side rods or ropes.

An automatic sprag, of the pawl and ratchet type, works on the side of the main shaft brake drum. It works by gravity when the car stops and acts in all positions of the change speed lever except the inside, neutral and reverse in which positions a small lever, sliding up an inclined cam on the change speed lever, withdraws the sprag permitting the car to be moved in either direction.



RIGHT SIDE OF MOORE MOTOR WITH REAR HALF AND CLUTCH IN SECTION



LOOKING FORWARD; BRAKE DRUM AND HOLLOW SUPPORTING ARMS

The steering wheel is made with three arms and tilts in either direction on two opposite arms by releasing a pin on the third right angle arm. Steering is irreversible through a double screw with ball thrust. A triple switch key on top the steering wheel enables connection to be made to either or both magnetos or the coil. A safety plug is also provided for cutting of all currents. On the steering wheel are also the throttle and spark advance levers. The gas throttle is also connected to the clutch pedal so that in withdrawing the clutch the gas supply is automatically cut down. The right pedal is connected to all three brakes, in addition to the usual side lever connection with the hub brakes. The pedal connection to the emergency brakes is through spring attachments, on the brake rods, adjustable so that the hub brakes do not take hold to skid the wheels. The cellular radiator tubes, of copper, are diamond shaped, of small cross area and arranged in zigzag order. The starting crank is not fixedly connected to its hub connecting with the crankshaft, but has a throw-out pin in the hub that acts automatically in case of back firing. The frame is of pressed steel of standard shaped side members and cross members of tubular squares and Z sections. It carries an aluminum under-pan extending the entire length of the classes. The dashboard support is formed integrally with the frame by combining it with the cross member at this point by bending the flanges upwardly to form a frame for the usual wooden dashboard. This design is used to give a maximum of rigidity for supporting the various devices nowadays carried on the dash.

Semi-elliptic springs are used in front, placed under the chassis. The rear springs are full elliptic with scroll ends and single or double links. The wheels are 36 inches and tires 5 inches. Wheelbase is 115 inches, giving ample length for any type of body. All bodies are fitted with double hinges attached to the rear cross member of the chassis so that the body can be elevated at the front when a general examination of the transmission and drive is to be made. The front and rear guards and all varnish finished parts are attached to the body lifting with it. The running boards are attached to the frame, do not raise, leaving the tool boxes and tools required for working about the machinery. The car has a patented form of three-point suspension for both the engine and transmission case combined with the double universal joints between the engine and transmission case and between the transmission case and the rear axle. The motor is carried upon a rectangular subsidiary frame, supported at three points, the two points at the rear end of this subsidiary frame being attached by circular bearings to a stiff tube extending between the sides of the main frame, and the front end by a swinging link and double pin support to the front steel cross member of the frame. The transmission case is suspended at its back end from the frame by two similar circular bearings, and the front end from a bracket on the tubular cross member supporting the engine, by a swinging link and double pin support.

It will be seen that any deflection of the frame cannot set up any strains in the engine and gear cases. Both engine and gearbox, being attached by these circular bearings, can slightly turn in these and adjust themselves lengthwise to any twisting or buckling of the frame by means of the suspension links. The position of the engine is determined by collars placed upon the tubular cross member. The introduction of a double universal joint between engine and gearbox allows for any misalignment of the engine and gearbox shaft in the event of these being put together improperly by inexperienced mechanics in overhauling the machine.

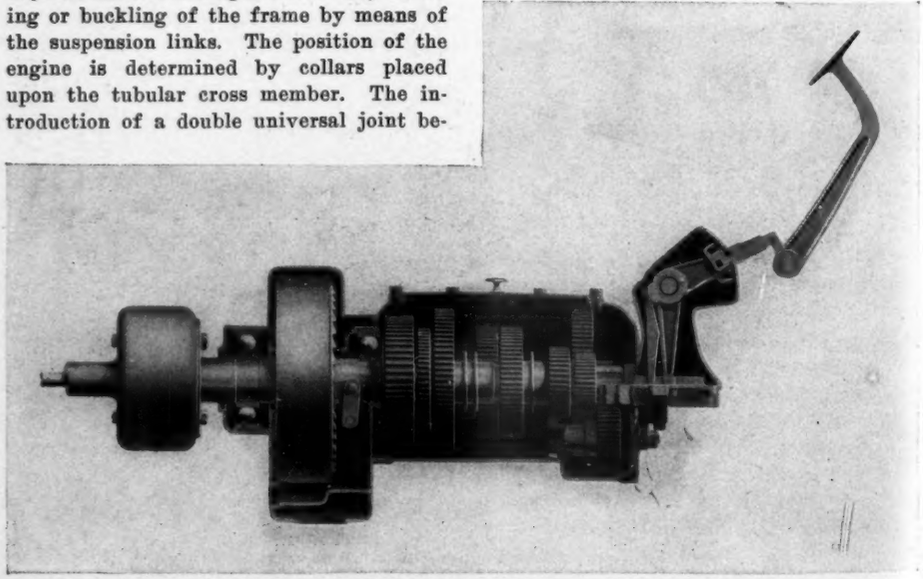
Further, the engine shaft transmission case shaft, and main drive shaft are slightly inclined to the frame or a horizontal line.

GOVERNMENT FIGURES

The latest United States government statistics show that 496 automobiles, valued at $1,866,402, were imported into this country during 1905. During December last 45 cars, valued at $169,376, were imported. The importations of automobile parts during these periods were valued at $136,057 and $29,730, respectively.

The exports of American automobiles and parts, it is reported, will soon reach the $3,000,000 mark, the total exports during 1905 having reached a value of $2,695,655, as compared with $1,897,510 in 1904 and $1,643,029 in 1903. During the calendar year 1905 the following countries received shipments of American automobiles: United Kingdom, $707,045; France, $269,703; Germany, $105,457; Italy, $163,978; other European countries, $239,379; British North America, $537,588; Mexico, $192,452; West Indies and Bermuda, $151,859; South America, $61,419; British East Indies, $31,793; British Australasia, $120,083; other Asia and Oceania, $63,577; Africa, $39,288; all other countries, $12,034.

It is announced that the December exports of automobiles and parts were valued at $196,645, as against a value of $214,516 during the same month of 1904. December shipments were destined as follows: United Kingdom, $75,258; France, $7,645; Germany, $1,651; Italy, $4,073; other European countries, $1,477; British North America, $23,827; Mexico, $29,672; West Indies and Bermuda, $20,498; South America, $5,507; British East Indies, $696; British Australasia, $8,964; other Asia and Oceania, $2,699; Africa, $5,760.



SIDE VIEW BRAKE DRUM AND AUTOMATIC SPRAG; PEDAL IN SECTION

DEVELOPMENT OF THE AIR-COOLED MOTOR

During the past season the air-cooled motor has gained in popularity with great rapidity. This is due quite as much to the disappearance from the field of several abortive plans, based on erroneous principles, as to the development of those few systems which have survived careful test, and proven unquestionably successful.

The tardy advance of air-cooling, as viewed from an engineering standpoint, is owing to the fact that in almost every instance an effort has been made to solve the problem with experience gained in producing water-cooled motors. This has been a serious mistake and has effected the attitude of the public toward the air-cooled idea most unfortunately.

The chief trouble has lain in the necessity for proper radiation. All the early experiments were directed toward cooling by air with cylinders designed for water-cooling. Therefore many radiating devices correct in principle and capable of giving excellent results have failed to be satisfactory. In short, air-cooling involves principles entirely separate and distinct from those applying to water-cooling and must be considered with a clear understanding of that fact.

The primitive idea in regard to air-cooling involved the reduction of the temperature of the cylinder walls by means of a blast of cold air blown directly upon them. This principle surviving for quite an extended period, all the motors had either a single cylinder of considerable bore, with a fan blowing directly on its head, or multiple cylinders of very small capacity, which did not require other than the natural circulation of air. The change from those types to one employing four vertical cylinders placed longitudinally in the car presented an entirely new problem in air-cooling, as it was evidently impracticable to blow air directly on the heads of all four cylinders. As a consequence of the growing demand for the four-cylinder vertical motor of considerable power, the advocates of air-cooling had to keep up with the procession or drop out.

It soon became apparent that it was unnecessary to direct currents of air on particular portions of the cylinders, or to make any special disposition of the air currents, other than to insure their free passage around the radiating device used for taking the heat from the cylinder shell. The true principle of air-cooling now became clear—that not merely is radiation required but that a proper system be employed to carry away the heat particles from the radiating surfaces.

It is important, of course, that the compression chamber be so designed that the surfaces exposed to the hot gases have an uniformly free exit to the exterior radiating device; but the great difficulty is in getting the heat from the radiating device into the surrounding air. Many failures in air-cooling can be traced to the fact

that the imperative necessity of conveying the heat from the metallic surfaces has been overlooked, and although the cylinder shell has been surrounded with the most elaborate arrangements for distributing the heat, the matter of conveying it away and providing for a constant supply of air at atmospheric temperature, has been entirely neglected. The basis of the remarkable success of certain motors during the past year, has been the care with which these details have been worked out.

The common impression prevails that makers of air-cooled cylinders advocate them because they can be cheaply manufactured. However true this might have been at one time, it is not true at the present date. The cost of manufacturing an air-cooled cylinder, employing all the special processes acquired by experience in this branch of the art, is considerably greater than for a jacketed cylinder of corresponding size. It requires more care, better tools and higher class workmanship to produce a cylinder with perfectly round bore, which will remain round, than the average man imagines. It is money well expended, however, because experience has shown that unless the development of a cylinder, to be air-cooled by any method, is begun with the laying down of the design and carried through all stages of casting, machine work, assembling and testing, it will fail, no matter how well it theoretically meets the conditions necessary to successful air-cooling. Not alone to the details of cylinder, piston and valve construction should care be given, the form of the hood, the design of the hood front, the size and form of the fan, the outlet provided for the heated air at the rear of the hood, are all factors which can to a great extent make or mar the result.

The success of the past season means not only that the system of direct convection of heat from the cylinders without an intervening medium has established itself so strongly in favor as to be a vigorous factor commercially, but it marks as well the trend of the public interest toward the simpler and more consistent system and away from the water-cooled idea. No further proof of this is necessary than the enormous demand for four-cylinder air-cooled cars of all powers and carrying capacity. But, if further proof was needed, it could be found in the interest taken in air-cooling by several prominent manufacturers of water-cooled cars, an interest which has carried them as far as to bring out experimental cars in which the water-cooled system has been replaced by some form of direct radiating device.

Now that the problem of successful air-cooling multiple cylinder motors placed lengthwise in the car has been solved, and cars of as high as 30 to 35 horsepower produced, which give results as satisfactory as those of the best water-cooled type, the commercial progress of the air-cooled motor will be much faster than heretofore. It would be no less unreasonable to presume that the air-cooled motor will entirely displace the water-cooled than was the contention several years ago that the development of a gasoline motor-driven car would see the extinction of the storage battery electric-driven car. The fact is, that each type will always have a field which it will fill, to the satisfaction of some people, better than any other. Whereas the water-cooled idea has seen its best days and will from this time on be crowded into smaller limits of practical value, the air-cooled system has only begun to find favor in the estimation of the public and has before it enormous possibilities for further development, not only in cars for commercial use, but for pleasure vehicles as well. The accepted simplicity resulting from the elimination of a water radiator, water pump, waterjackets and a piping system between the radiator and cylinders, is one point noticeable in air-cooled motors, and to this can be added the freedom from trouble in the cold months, occasioned by water freezing, anti-freezing mixtures injuring the pipes and jackets, and burst connections.

EDITOR'S NOTE—This is an article by F. H. Bogart, chief mechanical engineer of the Corbin Motor Corporation.

LATE INCORPORATIONS

Morristown, N. Y.—The Morristown Garage Co. has been incorporated, with a capital stock of $50,000. They will manufacture and repair automobiles, motor cycles, etc.

Trenton, N. J.—The Walter Auto Car Co. has been incorporated to manufacture automobiles. The capital stock of the company is $1,000,000.

New Haven, Conn.—The Foster Motor Co. has been incorporated with a capital stock of $25,000 and will deal in gasoline oil and steam engines.

Paterson, N. J.—The Motor Car and Storage Co. has been incorporated with a capital stock of $10,000, and will buy, sell and repair automobiles.

Cleveland, O.—The Auto Shop Co. has been incorporated with a capital stock of $50,000.

Buffalo, N. Y.—The Ducro Mfg. Co. has been incorporated with a capital stock of $5,000 and will manufacture motors, boats, machinery, etc.

Baltimore, Md.—A certificate was filed today incorporating the Mount Vernon Motor Co., for the purpose of buying, selling, exchanging, repairing, storing, renting, hiring, manufacturing, operating and otherwise dealing in automobiles and automobile supplies and accessories. The capital stock of the company is $5,000.

New York.—The New Century Auto Co. has been incorporated with a capital stock of $1,000, and will rent automobiles, operate a garage, etc.

Augusta, Me.—The Northern Automobile Agency has been incorporated with a capital stock of $10,000 to deal in automobiles.

Augusta, Me.—The Somerville Automobile Co. has been incorporated to deal in automobiles. The capital stock of the company is $5,000.

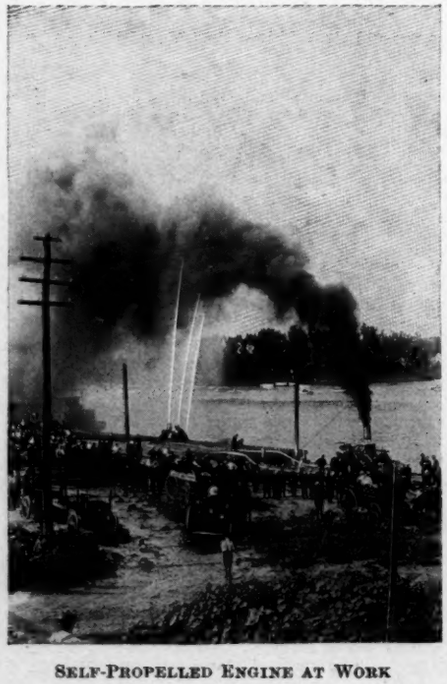
POWER-DRIVEN FIRE ENGINES

IN THIS, the era of the motor car, the motor fire engine clamors for one's attention now and then, and on such occasions is regarded as a comparatively recent innovation, notwithstanding, the first of this type of apparatus made its debut as early as 1840. Thus it is obvious, the self-propelled fire engine is by no means recent. In 1840, one P. R. Hodge, a mechanical engineer of New York, brought forth the first American steam fire engine, and, strange to say, it was a self-propeller. The engines were horizontal and had their cylinders attached to the smoke box of a tubular boiler of the locomotive type with the steam dome. The pistons of the steam and water cylinders were on the same rods and the connecting rods were attached to the cranks on the rear wheels. When the engine reached the scene of action the rear or driving wheels were jacked up, in which case they served as balance wheels for the engine. The pumps had receiving screws on the sides and delivery screws on the ends. The weight of this machine was about 3,000 pounds. In general appearance the engines and pumps of this early steamer resembled those of today, with the exception of being horizontal and being devoid of links, as one solid bar or rod formed both pistons. The engine was very efficient but Hodge, not unlike many another inventor, achieved his purpose before his time. The conservative volunteers of that period were strongly prejudiced to the introduction of such a mode of coping with the elements, consequently the creation of ingenious Hodge sunk into oblivion. Such was the first American self-propelled fire engine.

The second of this type was not constructed until 1867 and at that was merely an experiment. It was known officially as No. 225 and was constructed by the Amoskeag Corporation, of Manchester, N. H. As a result of this experimental steamer, a second one, known as No. 263, was built soon after, and was regarded as a wonder. It was exhibited throughout the country but failed to sell and was, therefore, placed in storage until some 5 years later, when the great Boston conflagration broke out, at which time the threatened city appealed to Manchester, N. H., for aid. The Amoskeag Corporation immediately dispatched the old propeller to the scene and it rendered such good service that the city of Boston purchased it. It was eventually altered for horse draft and is still in service. Such was the second American motor fire engine and in comparison with the steamers of the present date they were rather crude affairs. Engine No. 284 was the next of this type, and was sold to the city of New York and rendered good service, and wore out in active duty, giving entire satisfaction to the department.

On these early steamers a single chain drive was employed, engaging sprockets on the engine shaft and the rear wheel. The axles were stationary.

In 1873 another steamer was built for the city of Detroit, Mich. A new improved compound was used on this steamer, the compound or differential was located on the rear axle which turned, which, at that time, was considered the weakest part of the machine, but later this theory was not confirmed. The late Governor E. A. Straw, who was at the head of the Amoskeag company, and the mechanical superintendent, Nehemiah S. Bean, were both of the opinion that the engine would not be a complete success but evidently they were mistaken, for it did work and met with approval from all parts of the east.



SELF-PROPELLED ENGINE AT WORK

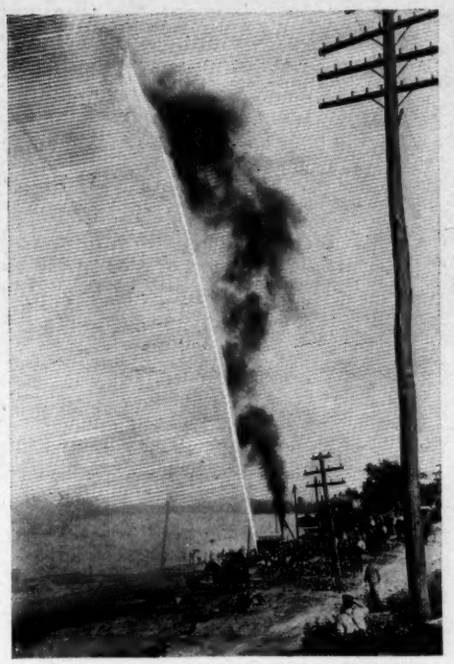
The next stage of construction was reached in 1889, when an extra large and powerful steamer was ordered by the city of Hartford, Conn. This was the largest engine of its class in the world for many years, and, because of such was commonly called Jumbo. It was frequently shown to out-of-town officials. In the construction of Jumbo, a new problem confronted its builders. Under the current practice of a revolving rear axle that member was not considered sufficiently strong to withstand the strain of so large a machine. Thus, it was the driving mechanism was brought up-to-date resembling that of the present day motor car. A stationary axle was deemed expedient, allowing the rear wheels to revolve freely. An intermediate shaft, containing the differential and geared to the main shaft was adopted.

Hartford, Conn., has without a doubt done more to thoroughly demonstrate the efficiency of this type of apparatus than any other city in the world. Four steamers of this type have graced the Hartford service, the first in 1876, a first-sized double-crane neck, which is still on duty as a spare machine, 30 years in service, a good record surely. The second was installed in 1879, and was classed second-sized, double.

Chief Eaton, of the Hartford department, was strongly in favor of an extra large and powerful steamer of the self-propelling type, consequently in 1889 an order for an extra-size steamer, self-propelled, was placed with the builders, by the Hartford department. It was classed as an extra first-sized, double-crane neck, and proved a great success. The dimensions of Jumbo are as follows: Weight, 17,000 pounds; pump capacity of 1,350 gallons a minute; boiler, 40 inches in diameter; cylinders, 9½ inches in diameter; pumps, 5½ inches in diameter, and stroke of 8 inches. At the first trial this engine threw through 50 feet of leading hose of 3⅛ inches in diameter a stream 348 feet; through a 1½-inch nozzle, 338 feet; through a 1¾-inch inch nozzle, 319½ feet. So it was Jumbo marked the up-to-date production in steam fire engines.

In August, 1901, the fourth steamer of the self-propelling type was installed in Hartford. Like Jumbo it is an extra-sized, first-class, double crane neck and is a fine piece of apparatus. It is a trifle larger than Jumbo, the boiler is of the submerged flue type, 40 inches in diameter, flaring at the bottom to 46 inches, composed of 313 1½-inch copper tubes, the grates are 42 inches in diameter, the cylinders of the engine, which will develop 80 horsepower, are 9½ inches in diameter, pumps 5¾ inches in diameter, stroke 8 inches. The entire engine weighs 18,000 pounds, carries a 6-inch suction, throws 1,450 gallons per minute and can throw four 1¼-inch streams at once with good effect. A 100-gallon water tank supplies the boiler when the engine is on the road, and is located under the tillerman's seat. Two throttles comprise the control, one on the left side of the boiler to control while pumping, the other is located on the right side of the boiler in the rear and controls while steaming on the road. The reverse is conveniently located on the right side and works on a quadrant. Three sizes of hose may be used—2½, 3 and 3½ inches in diameter. The larger ones can easily penetrate an ordinary brick wall. Steam is maintained at 100 pounds while the engine is housed and on the road 125 pounds is maintained. A boiler located in the cellar serves a complete circulation of hot water and steam, when housed. The engine has two balance-wheels and is capable of 20 miles an hour. The smoke-stack, into which the engines exhaust direct, is 16 inches in diameter and is provided with an extension to afford a better draught when necessary. There is no fire under the boiler when the engine is in the house, but as soon as it leaves to answer an alarm the fire is automatically lighted. In this engine, as in Jumbo, the engines are geared directly to the intermediate shaft upon which the differential is located. Two endless steel chains are employed as drivers and engage sprockets on the two rear wheels. Iron spikes or buttons set in the tires serve to give the driving wheels a hold upon the pavement. Two compensating rods serve as chain sets, to allow for slack, much the same as in a bicycle. The wheel-steering system is employed, the steering-post working a series of worm and bevel gearing, the wheel being 36 inches in diameter. In heavy winter weather horses are employed for the same purpose, in which case the steering-post is simply taken out.

These two engines, being extra-sized, are practically equivalent to four smaller ones, and are indispensable when it is considered that the city has but nine engines in the service. These two extras are located so as to cover the more densely populated districts of the east side and the business portion, which fact does not imply, however, that they cover only the center sections of the city, for it often



A HARTFORD SELF-PROPELLER AT WORK

happens that they are called on a 2 or 3-mile run, being able to leave the house 6 seconds after receiving the alarm. Despite their great size they are much cheaper to maintain than a horse engine. It costs the department about $28 per month to maintain one of these engines, against $62 for a smaller-sized horse engine.

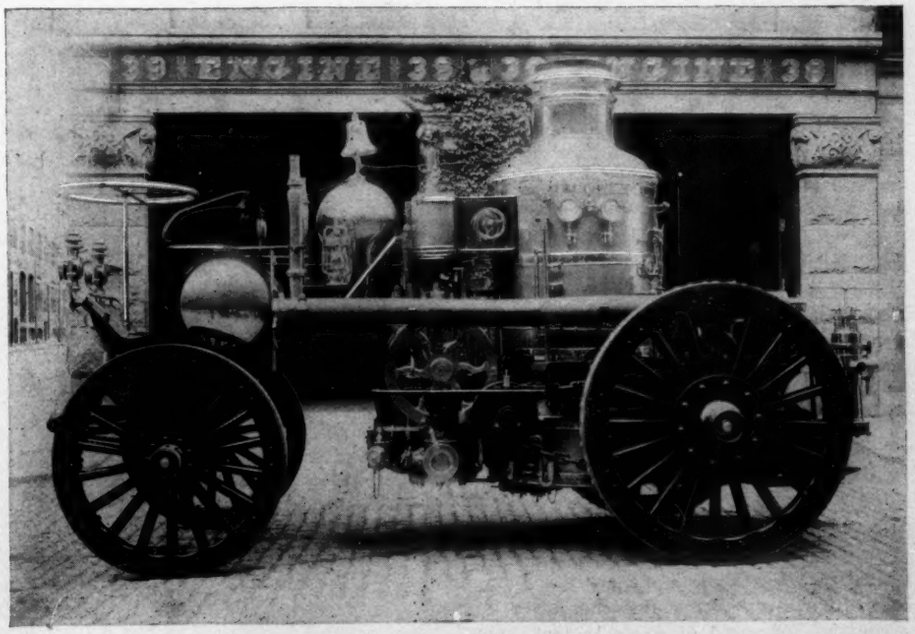
Jumbo was at one time displayed for Commissioner Russell, of Boston, who, when he had reached home, ordered two duplicates, a shade larger in pumps. The splendid performance of these engines at the Merrimac street fire, in Hartford, when it alone took care of the entire front of the building, would have been commented on at great length by the papers but for the terrible calamity which overshadowed everything else. One of the papers spoke of getting stuck in the snow on Staniford street. That was an exaggeration. The delay was not over 30 seconds, and an engine drawn by three horses could hardly have got through at all.

The lamented Capt. Victory took No. 38 out just after the blizzard, just to see how it would go through the heavy snow, and he reported that he was really surprised as well as highly delighted with the ease with which the great machine surmounted all difficulties. He said it went right through like the plow of a locomotive. But the public is apt to forget that the main purpose which actuated the purpose of these machines was not to obtain a self-propeller, but to obtain a more powerful engine.

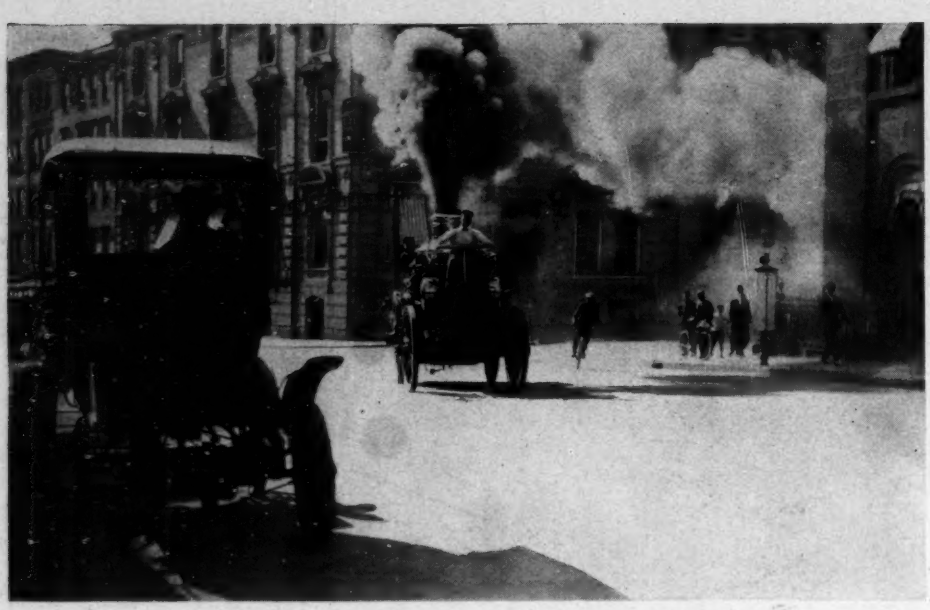
It is in the amount of water and the force of the stream thrown by them that makes them pre-eminently such a success. As has been said, one of them took care of the entire front of the Merrimac street fire. The writer is persuaded that but for that engine there would have been more fatalities, including some burning. It was that engine which really put out the fire. Its work had been accomplished and it had shut down at the time the floors fell.

Self-propellers are also used in Pittsburg, New Orleans and Portland, Me., all being of the extra first-sized type. There are many who contend a lighter machine is preferable, which opinion is hardly entertained generally. The machine of today is built for business and accomplishes its work. Ex-Commissioner Billings, of Hartford, is of the opinion a steering-knuckle could be used to advantage in place of the worm gearing and being a drop forger, his opinion is not without some weight.

Motor combination chemical and hose wagons are coming into use. The American La France Engine Co., of Seneca Falls, N. Y., is building this type of apparatus,



POWER-DRIVEN ENGINE OF THE BOSTON DEPARTMENT



SELF-PROPELLED ENGINE RESPONDING TO AN ALARM

steam driven. New London, Conn., claims to be the first city in this country to employ a wagon of this type. It is an efficient piece of apparatus and may be described as follows: In general appearance it closely resembles the ordinary horse-drawn combination wagon. The power is furnished by two two-cylinder engines of the Mason type, suspended at an angle of 45 degrees on pivots, permitting them to sway a shade, as may be necessitated. Each engine is rated at 15 horsepower and transmits its power to an intermediate-shaft and thence to the rear wheels by means of an ordinary linked roller chain and sprockets. A peculiar feature of this machine is the mode of transmission. No differential is employed. The engines drive to a split shaft, each engine utilizing one-half of it. One engine can easily propel the machine should the other give out. Despite the elimination of the differential, no skidding is perceptible. The body is mounted on a primary channel steel frame, resting on elliptical springs secured to a secondary steel frame mounted on the axles. The boiler is 28 by 30 inches, composed of 1,000 ½-inch copper tubes and is carried up forward behind the front axle. The vent stack is located in the rear of the seat. The boiler is tested to 1,600 pounds; 250 pounds are maintained in the house. Three pumps supply water from two 40-gallon tanks, sufficient for a run of 9 miles. Each engine has an individual pump, while a third acting automatically supplies water when the engine is housed. Two 30-gallon tanks supply fuel, but when in quarters city gas is utilized, costing about $18 per month. The wheels are 36 inches, fitted with 4-inch solid tires. Two 30-gallon chemical tanks extend along the side of the car. The vehicle is wheel-steered, a peculiar mode being employed. A four-armed wheel is secured to a steering pillar of ordinary type which is secured to an eccentric, composed of a steel block held within a steel collar, secured to a rod which engages the left wheel. One throttle controls both engines and is located in the center of the driver's seat. The reverse is located on the steering pillar underneath the wheel. Twenty-five miles an hour is easily maintained. Three hundred feet of chemical hose and 1,000 feet of 2½ duty hose together with essential sundries comprise the outfit.

The members of the Niagara Hose Co. purchased this machine with their own funds, and receive no remuneration for their services, as New London has but a volunteer department. The Niagara chemical is good for speed and need hardly take another's dust.

MORGUE WAGON THE LATEST

An automobile morgue wagon is the latest. It is a new feature of street life in Fresno, Cal., and is attracting a great deal of attention. Stephens & Bean is the firm using this unique car. It is in daily use by the firm and because of its ever-readiness and being very speedy, it has already become indispensable. The other day it made a trip of 90 miles in 7 hours. The automobile morgue wagon carries the chauffeur and one attendant, besides the casket and the necessary articles that are used in the business.

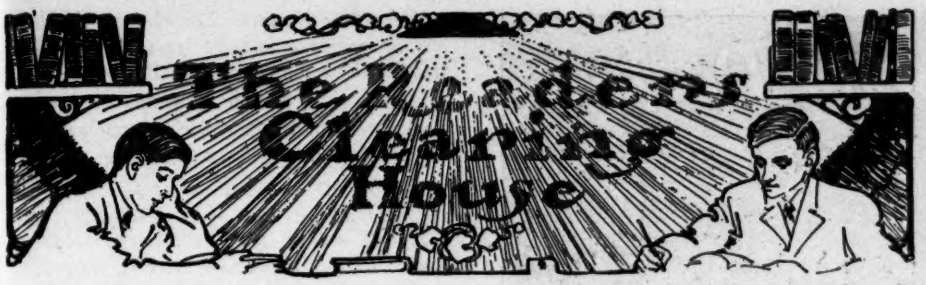
MOTOR CAR LITERATURE

The many styles of radiators built by the Long-Turney Mfg. Co., of Rome, N. Y., are well shown up in a thirty-six page catalogue. Besides showing in half-page views the many radiators made, several pages of argument on the different radiator designs are given and these are illustrated with line drawings showing the points to be observed. The descriptive matter throughout is profuse.

Commercial machines built by the Rapid Motor Vehicle Co., Pontiac, Mich., are shown in all shapes and sizes in the concern's latest booklet. Besides the different models being shown in very large full-page illustration, the parts of the machine such as chassis and motor are shown. Only a few specifications regarding each model are given and descriptive matter on the machines in general is not included.

Gasoline automobiles manufactured by the members of the American Motor Car Manufacturers' Association, with head offices in the Marquette building, Chicago, are all illustrated on separate pages with mechanical specification beneath the illustration in a handy volume published by the association. Sixty-nine different models of pleasure and commercial machines are shown, many concerns showing three or more models. In the front of the book is a list of the members of the association, with the officers, and on succeeding pages are given the aims and purposes of the organization. The book is well made, the illustrations are good and the specification below each illustration gives the leading points of the machine.

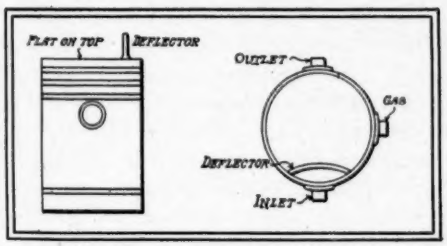
HARTFORD ENGINE, INSTALLED IN 1901, STILL IN DEMAND



ALTERING AIR-COOLED MOTOR

Brooklyn, N. Y.—Editor MOTOR AGE—I have a 2¾-horsepower de Dion motor which at some time was used on a tricycle. I have attached it to a motor cycle, placing it in front. Can I take off some of the radiating flanges so as to reduce the weight? I notice that about 90 per cent of the foreign motor cycle motors have only three or four flanges at the top. Is there any way of determining the correct size of the hole in the spray nozzle of the carbureter? I am using one not adapted to this motor, but think by changing the size of the spray nozzle I can use it successfully.—W. R. W.

Very little weight would be taken off the motor by removing a few of the flanges. It is probable the designers of the motor made it approximately correct in the first place. If less than 2¾ horsepower was



DETAIL OF TWO-CYCLE MOTOR

developed by using a lighter charge of gas, perhaps the motor would cool sufficiently if some of the flanges were removed, but if a full charge of gas was used trouble might ensue from heating. The way to determine the size of the spray nozzle hole is to experiment with the mixture until the most satisfactory results are obtained.

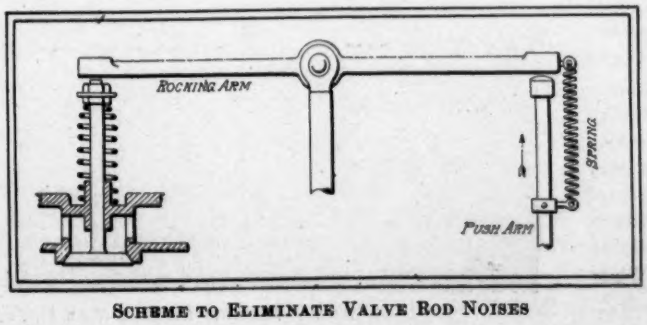
CRANKY TWO-CYCLE MOTOR

Brookville, Pa.—Editor MOTOR AGE—I have designed and successfully run a high-speed two-cycle 4 by 4-inch gasoline motor. I have also built a two-cycle two-cylinder 5 by 5-inch motor. I have two separate carbureters. When the engine starts the cylinder that gets the first impulse will not miss an explosion up to 1,000 revolutions. The other cylinder will do nothing but backfire. Stop the engine and start it again, and get the cylinder that backfired to start first, it will run equally as satisfactorily as the other cylinder. In other words, one cylinder running at a time shows a high brake test and will not miss an explosion, but as soon as I start them to work together, one will run steadily and the other will backfire. I have tried almost every conceivable thing, with precisely the same results. The cylinders are cast in pairs—no leak occurs in the cylinder or in the crankcase. I have tested that thoroughly. The inlet to the crankcase is 1¼-inch pipe opening; to the cylinder ⅝ by 2¼-inch. The inlet from the crankcase to the cylinder is 7-16 by 2½ inches clear of the bridge. The outlet is 1 by 2⅞ inches clear. The compression space is 15-16 inch. The deflector is 1½ inches high and just covers the ports.—R. E. T.

As both cylinders work satisfactorily when run separately, the spark is not set properly when running both cylinders. Test the spark for each cylinder or when the piston is in the correct position for firing. Note the adjustment of the timer and, when satisfied this is correct, try the other cylinder in precisely the same manner. With the spark set the same for both cylinders, the motor should give good results at all different motor speeds.

ELIMINATING NOISES

Peoria, Ill.—Editor MOTOR AGE—I run a car with an air-cooled motor which has valves operated by a rocking beam, as shown in the accompanying illustration. The beam is pivoted in the center and rests at one end on the head of the valve stem and on the other on the head of the pushrod, which is raised by the camshaft. There is considerable noise in connection with the working of this mechanism, much of which I think could be eliminated. When the cam raises the pushrod there is a knock—first when the cam hits the bottom of the rod, again when the top of the pushrod strikes the end of the rocking beam, and still again when the opposite end of the rocking beam on its downward motion strikes the head of the valve stem. Cannot at least one or two of these knockings be dispensed with? What will be the result if the upper end of a coil spring is attached to the outer end of the rocking arm and its lower end secured to a collar, clamped several inches from the upper end of the pushrod? This construction would at least hold the upper end of the pushrod and the outer end of the rocking beam together, and eliminate one knock.—AIR COOLER.



SCHEME TO ELIMINATE VALVE ROD NOISES

There is no reason why both ends of the pushrod could not be permanently fixed with fork and pin connection, allowing the top end of the fork to screw over the push rod to compensate for waste. In doing this, however, care must be exercised in construction. These points must not be fixed so as to prevent the valve from seating quickly; in other words, the downward movement of the pushrod must be quicker than the movement of the valve to insure good valve operation.

CARRYING INNER TUBES

Lincoln, Neb.—Editor MOTOR AGE—What is the best way to carry inner tubes for automobile tires? Does it injure them to keep them folded or is it best to keep them inflated so they will retain their shape?—J. E. Foster.

Nearly all tire makers send tubes out folded and wrapped in paper, much as any ordinary commodity would be wrapped, so it is safe to presume little damage will result from carrying tubes this way. It is

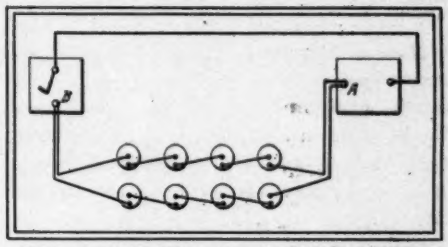


DIAGRAM FOR CONNECTING OLD BATTERIES

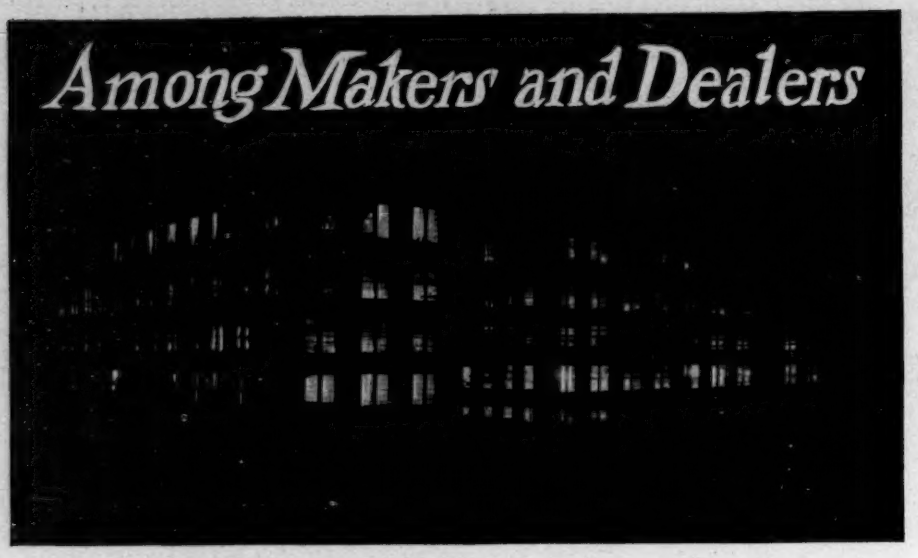
not necessary to inflate them. As a matter of fact, if they are folded with all the air excluded and carefully wrapped in heavy paper or canvas they will be amply protected for months at a time.

CONNECTING OLD BATTERIES

Bluffton, Ill.—Editor MOTOR AGE—In the Readers' Clearing House of December 14 last there appeared an article on wiring old batteries. In figure 2 if P and N at A, and P and N at B are connected, one with the coil and the other with ground wire, with the switch between the coil and the battery at B, when B is connected with the coil and A, P and N with the same pole of the switch, will it not short-circuit the cells?—W. N. FOWLER.

Referring to figure 2 in the Readers' Clearing House columns of December 14, it is not intended to connect P and N at A, and P and N at B, as this would short-circuit the batteries if connected to the same binding posts. Make a complete circuit, as in the diagram. The connection at A must be to all positive wires and those at B to the negative. This will give the maximum voltage of the combined cells.

Among Makers and Dealers



WORKING OVERTIME—NIGHT SCENE AT THE FRANKLIN FACTORY

Good News for Kids—A company to manufacture automobiles for children is being formed by D. M. Dearing and P. B. White, both of Jackson, Mich. The plant will be located at Leslie, Mich.

Deal Pending—It is reported that the Aurora Automobile Co., of Aurora, Ill., which makes a doctor's runabout, may sell out to Chicago capitalists. Dr. D. D. Culver is the designer of the car.

Now in Saginaw—George J. Bohnet announces he will open a garage at 114-116 South Franklin street, Saginaw, Mich. Bohnet was in business at Lansing, Mich., but sold out to Wall & Wurges, having secured the Reo agency for Saginaw and Bay City.

Auburn, N. Y.—The Ultra compound tire pump, heretofore made by the Ultra Pump and Power Co., is now being made by the Bridgeport Brass Co., of Bridgeport, Conn. The change was made because the other concern had not the necessary facilities to manufacture in large lots. It will attend to individual orders.

Marvel Moves—Harry Marvel, formerly with the Pope company in Philadelphia, has begun his duties as manager of the garage of the Amos-Pierce Co., of Syracuse. W. H. Bex, of the same company, has taken a position as manager of the municipal garage of Syracuse and will have charge of the automobiles belonging to the city. It is rumored the city will buy another police patrol and one or two other vehicles for heads of departments.

Winton Enterprises—A big restaurant was recently established at the Cleveland plant of the Winton Motor Carriage Co. for the exclusive accommodation of the factory and office forces. A school of automobile instruction has been opened with hourly sessions daily at noon. This school will take up in orderly manner not only the theory and practice of automobile construction in general, but will also cover manufacturing, sales and advertising methods in an exhaustive manner. While the school will be under the immediate direction of General Sales Manager Shanks, the technical lectures will be given by the company's engineers, and from time to time addresses will be made by President Winton, Vice-President Henderson and Secretary Brown.

Reorganize—The National Leather Tire Co., maker of leather tires for automobiles, composed of E. F. Dudley, D. R. Salisbury and Oliver D. Salisbury, all of Owosso, Mich., has effected a reorganization, Mr. Dudley retiring from the company. The new company will be known as the Salisbury Leather Tire Co. and has the following officers: D. R. Salisbury, president and general manager; Oliver D. Salisbury, assistant manager; E. P. Waldron, Saginaw, vice-president; Robert Steel, St. Johns, secretary and treasurer; Arthur D. Cowell, Flint, sales manager; D. R. Salisbury, E. P. Waldron, Robert Steel, Edwin Locke, Detroit, and C. E. Brandt, Flint, directors. The capitalization is $100,000. The Salisburys formerly conducted a glove and legging business is Owosso, but this has been discontinued and the leather tires will be manufactured in the old factory building, which will undergo many improvements to fit it for this purpose.

Holson Officials—The Holson Motor Patents Co., of Grand Rapids, Mich., at its recent meeting elected the following officers: President, M. B. Church; vice-presidents, Alfred Holson and Dr. A. M. Webster; treasurer, Wesley W. Hyde; secretary, W. Clay Church.

May Sell Property—L. R. Parker, trustee of the Monarch Automobile Co., of Aurora, Ill., has filed a petition for the sale of the property of the defunct concern. The stock has been inventoried and is estimated at $2,600. The total indebtedness of the company is $19,000.

New Factory Contemplated—Extensive improvements to meet the demands of the 1906 business are under contemplation by the Auto Brass & Aluminum Co., of Flint, Mich. The capital has recently been increased from $25,000 to $75,000, and with this money new machinery will probably be purchased and a new factory erected.

Train of Ramblers—The San Francisco branch of Thomas B. Jeffery Co. has ordered sixteen carloads of surrey type 1 for immediate delivery. This means sixty-six machines and the entire order will be loaded into sixteen cars which will make up an entire train. This will be one of the largest single shipments of automobiles ever made.

Big Canadian Concern—The Dominion Automobile Co., of Toronto, Ont., has been incorporated with a capital stock of $100,000. Messrs. Mackenzie & Mann, E. S. Clouston, of Montreal, and W. H. Beardmore, Toronto, are interested in the company, which will have branches in Montreal and Winnipeg, Man. W. A. Power, manager of the Winnipeg branch of the

HOW A DETROIT CHURCH WAS MADE INTO A GARAGE

Canada Cycle and Motor Co., has been appointed manager of the new company for that district.

Come to It—Boggs & Buhl have joined the procession of automobile-using department stores and a monster delivery car has been added to the equipment of their mammoth store in Allegheny, Pa.

Tire Hustlers—A prize of $250 has been offered by the Continental Caoutchouc and Gutta Percha Co., of Hanover, to the crew making the fastest time in fitting Continental tires to a set of wheels at the Berlin show this month.

Hawkeye Enterprise—The Motor Components Mfg. Co., of Des Moines, Ia., has filed articles of incorporation with a capital stock of $30,000, the incorporators being B. S. Walker, W. H. Ditto, G. C. Hubbell, H. G. Guer, R. McCutcheon and F. G. Hubbell. The company intends making and selling automobile parts and accessories.

For Shipping Automobiles—The Pennsylvania Railroad Co. has ordered 100 box cars from its shops at Altoona, Pa., which will be designed especially for the shipping of automobiles. The Pennsylvania is the first railroad to admit the need of such cars, but its example is likely to be followed by other roads owing to the complaints of shippers that their cars are not properly handled.

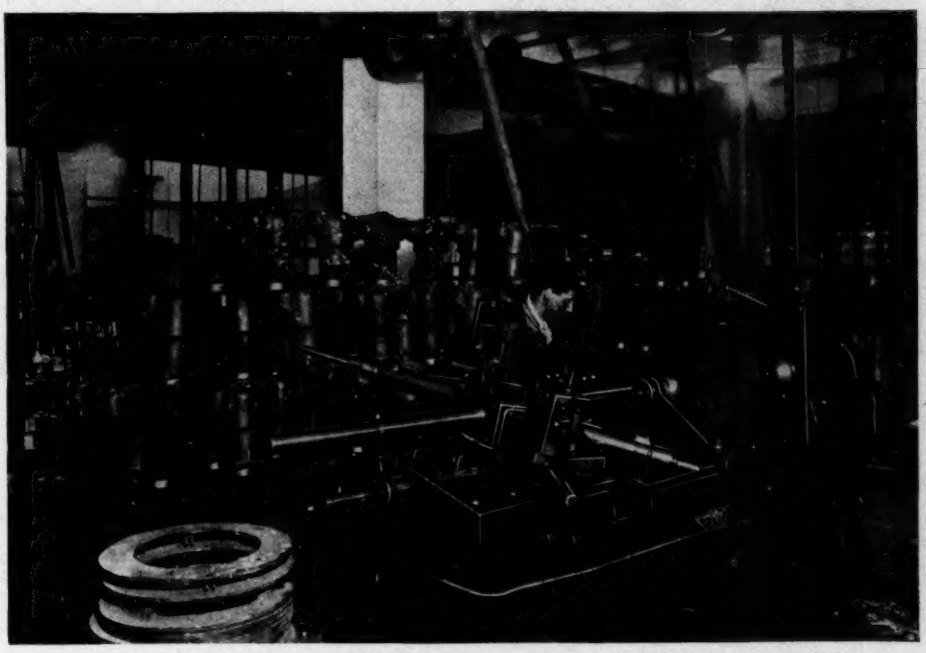
Westinghouse Plant—The Westinghouse Machine Co. is starting to manufacture automobiles at its big East End plant, in Pittsburg. Plans for an automobile plant are being considered and it is probable that within a year George Westinghouse will have the automobiles he builds manufactured in the Smoky city instead of in France. A special type of battery is now being tested by the Synnestvedt Machine Co. for the Westinghouse interests.

Church a Garage—Not content with putting the horses out of business, replacing the bicycle trade for the benefit of a lot of enterprising merchants, and assuming a prominent place in all legislative halls and divorce courts, the automobile is now invading the church. Abandoned by the North Woodward Methodists, this church, on the corner of Woodward and Harper avenues, Detroit, was readily seized upon as a location simply ideal for a suburban garage. The boulevard is but a few blocks away and a repair shop within reach fills a long felt want. The only change visible from the outside, incident to the alteration in purpose of the building, is at the entrance, where the steps have been torn down and a runway constructed. The interior, however, is a startler. In the dim cathedral light of a winter's sun, filtering through the mullioned windows, a force of men is engaged, working on the cars in for repairs. Where once the pulpit stood and Rev. W. B. Collins preached is a big work bench with vises and other paraphernalia. Instead of the congregation, rows of motor cars are drawn up, allowing only aisle space in between.

Starts in Binghamton—The latest automobile enterprise in Binghamton, N. Y., is the Binghamton Motor Car Co., which has been started by Percy J. Calph and Howard J. Brown. The company will handle the Pope-Toledo and Olds.

Premier Secretary Dead—Clarence M. Zener, secretary of the Premier Motor Car Co., died recently at Colorado Springs, Colo., of tuberculosis. The remains were sent to Indianapolis, where burial took place.

Not All of Them—The Remy Electric Co. disputes the fact that all American makers that use magnetos are using those of foreign makes and to illustrate its statements points out the fact that on the Stearns, Columbia, Pope-Toledo, Apperson, Knox, Matheson, Austin and other cars may be found Remy magnetos.



WORKING ON A BIG LOT OF CYLINDER CASTINGS AT THE THOMAS PLANT

Bus Line in Kansas City—D. L. Doering has been granted a 3-year franchise by the park commissioners of Kansas City, Mo., to operate an automobile line over the roadways in Swope park, the city to get 25 per cent of the gross receipts. For a 19-mile ride 20 cents will be charged, transfers being issued so stops can be made by the passengers.

Diamond Famine Over—The Diamond Rubber Co. has resumed business, figuratively speaking, and the Diamond branch stores are again completely stocked. For 3 months the company has been adding to its equipment and in announcements just sent out states that all business can now be taken care of. In many sizes, Diamond branches as well as the factory, have not been able since November to make immediate deliveries; but the erstwhile famine is reported over and the additional equipment which has just been placed in operation, it is promised, will prevent any recurrence of such trouble.

Smoky City Deal—The Atlas Automobile Co. will be the Pittsburg distributer for the Maxwell-Briscoe and the Premier. The Atlas' territory will embrace western Pennsylvania, West Virginia, southern Ohio and western Maryland.

Chapin Leaving Olds Company—Roy D. Chapin, sales manager for the Olds Motor Works, will sever his connection with that concern on the first of next month, after being in the Olds harness for a period of 5 years. Mr. Chapin does not state his intentions for the future.

Officers Chosen—After electing Dr. William J. Mercer president, John McQuaid vice-president, Fred A. Cooley treasurer, Walter S. Casey and retaining the old board of directors, the Berkshire Automobile Co. voted to increase its capital stock from $50,000 to $250,000.

Works His Way Out—The E. R. Thomas Motor Co. has a unique photograph showing a workman in the Buffalo factory surrounded by cylinders which he is grinding out on one of the giant grinders the company has installed in its new plant. It is jokingly remarked that the workman is first surrounded by cylinders and then forced to work his way out.

Show of Its Own—The Banker Brothers Co., of Pittsburg, will have an automobile show the week of February 12 at its new show room at 239 and 241 Diamond street, which was opened February 5. The affair will reproduce the New York show exhibit as far as possible with the models of the cars which the Bankers sell. Chassis of the Studebaker, Pierce, Cadillac and Stevens-Duryea will be shipped to Pittsburg at the close of the Chicago show and the three Cadillacs shown at New York will also be on exhibition.

From the Four Winds

HOW THE AUTOMOBILE HELPS OUT THE WIYD OCCASIONALLY

Dust-Destroyers—The sporting commission of the Automobile Club of France has ruled that hereafter all racing cars must have a horizontal exhaust under the chassis, raised sufficiently to prevent dust being thrown up from the road.

That's Growing Some—The Bay State Automobile Association started with a membership of five and now boasts 425 names on its rolls. It has done yeoman work for good roads and legislation and has headquarters in the Woodland Park hotel at Auburndale, Mass.

Motorist Wins—The circuit court of La Crosse, Wis., has decided a suit brought by the mother of Ferdinand Simonson against Henry Boehm in favor of the defendant, ruling that little children who collide with automobiles while playing tag in the streets cannot recover damages for slight injuries they may receive.

Aero Club Affairs—The Berliner Luftschiffahrt Verein, otherwise the Berlin Aeronautical Association, has 808 members, including twenty-seven women. Eighty-eight balloon ascents were made last year, seventeen of which were special ascents. In the eighty-eight ascents 284 persons participated, 10,225 miles being covered. Three balloons are owned by the association, while a fourth is under construction.

Non-Stop Run a Success—The Peerless scored another non-stop success when the trial promoted by the William Herrick Co., of Chicago, was completed at 4:33 o'clock Thursday morning, January 31, with the ten centuries done in 44 hours 15 minutes. To make sure the engine was kept running in the store until last Monday. W. D. Foreman and Eddie Prye were the drivers on the long grind, alternating at the wheel. Their only mishaps consisted of one cut tire and a puncture. The car was fitted with Goodrich tires. Sixty gallons of gasoline and 4 quarts of lubricating oil were used. The other Peerless non-stop run took place in Philadelphia, starting New Year's day, and the car then traveled the distance in 53 hours 5 minutes.

Air Sailor Quits—Count Zeppelin, prominent among the foreign aeronauts, has announced his retirement from the game since his recent accident in Germany in which his airship was badly damaged. It is said the accident was due to faulty construction.

Tows Iceboat—A peculiar use for an automobile has been discovered by J. S. Spargo, manager of the Motor Car Co., of Minneapolis. Recently Mr. Spargo, while driving in a Jackson, discovered an iceboat becalmed on Lake Calhoun. He went to the rescue, threw the ice yachtsmen a rope and towed the craft to shore.

Non-Stoppers in Denver—M. B. Fetscher, driving for Charles Bilz, of Denver, piloted a Franklin touring car in a 24-hour nonstop run, in which 325½ miles were covered, although it is estimated the engine itself ran about 480 miles. It is given out that on the trip 19½ gallons of gasoline and 3 quarts of lubricating oil were used. There was only one mishap—a puncture.

Makes Long Trip—J. W. Haynes, of the Haynes Automobile Co., of Kokomo, Ind., arrived in Chicago on the night of January 31, having driven a 50-horsepower Haynes, the duplicate of the car that participated in the Vanderbilt trial, from New York, a distance of 1,100 miles the way Mr. Haynes came. He was accompanied by his mechanic, J. C. Elikoff. They left New York the Sunday after the show, so it took them about 10½ days to make the journey. They met with no mishaps, although they were forced to use tire chains the entire distance. A day was lost in Philadelphia securing a Pennsylvania license.

End of Cup—The Bennett cup now reposes in the museum of the Automobile Club of France, Richard Brasier having turned over the trophy to the governing body. This is taken to be the end of the famous cup.

Rockford Has Election—Officers for the Rockford Automobile Club, of Rockford, Ill., have been elected as follows: President, E. K. Barnes; vice-president, N. F. Thompson; secretary, H. W. Dickerman; treasurer, A. W. Robertson; director for 2 years, Dr. E. S. Hunt.

Atlanta Wants Club—There is a movement under way in Atlanta, Ga., to organize an automobile club. The sport has flourished so there that it is believed it is time some sort of an organization should be started. In the last 16 months the number of cars in Atlanta has increased from fifty-five to over 200.

F. A. M. Allies—The Federation of American Motorcyclists announces an alliance with the Amateur Athletic Union and the National Cycling Association by which the three agree to respect each other's rules and to recognize and enforce all suspensions and other penalties.

Sorel Again Winner—Sorel, winner of the Pyrenees tour in France last year, has again distinguished himself, this time capturing the cup put up by the maharajah of Mysore over a 500-mile route from Bombay to Mahableshwar. Sorel used a de Dietrich built after his own ideas and adapted to Indian use. The car had an exhaust and radiator of extra large size, while the springs were also made more powerful than usual.

Doing Well—The Automobile Club of Pittsburg announces that a meeting of the Pennsylvania Motor Club Federation will be held in Philadelphia about March 1 for the purpose of completing the organization and electing officers. The federation hopes to form a strong enough combination of clubs, associations and consulates of the American Motor League to be able to wield some influence at the next meeting of the Pennsylvania legislature, which will be held in January, 1907.

Herkomer Prizes—The city of Munich, Germany, has put up $7,400 in cash prizes to be distributed among the first seventeen automobiles to finish in the Herkomer tour. There will be two prizes of $1,000, two of $600 each and ten of $250 each. All the cars covering the route will receive honor shields, for which $800 will be spent. In addition the leading German and Austrian artists have been invited by the Bavarian Industrial Art Society to submit designs of artistic work suitable for prizes. It is rumored

that Percy Pierce, winner of the Glidden trophy, will pass up the American event this year and have a try for the Herkomer as well as for other leading touring events on the continent.

After Delinquents—As it is almost common talk that there are a large number of automobiles in Michigan which have so far evaded the staet tax on the machines, the Michigan tax commissioners are making so strenuous effort to gather them into the fold.

Queer Suit Started—The city of Owosso, Mich., is defendant in a $5,000 damage suit as the result of a rather peculiar automobile accident a short time ago. Harold Priest, of that city, through his next friend, has commenced the suit. It seems workmen left a wire stretched across one of the streets and young Priest, while automobiling with his parents, was caught under the chin and hurled from the car when the machine passed under it. As there was no red light to denote the presence of the wire the city is held liable.

Trade Chances in India—According to consular reports recently received by the Washington government on the subject of the automobile trade in India, complaints are made that the French manufacturers in their dealings with India employ English agents, and that these agents naturally discriminate against all makes in favor of those of Great Britain. It is set forth that during the last 2 years automobiles and motor cycles have been used in such rapidly increasing numbers in Calcutta, Bombay, and Madras that several French firms, having consulted French government officials stationed in India, are now taking steps to open a vigorous campaign. Already Calcutta possesses an essentially French garage and depot. During the fiscal year 1904-5 automobiles to the number of 128 were imported into Calcutta, in spite of the fact that Bombay is a much more favorable port of entry. From the rapidity of the cult of the bicycle has spread throughout India, it is reasonable to predict a similar expansion for automobiles. The native is no opponent of progress. He has accepted the change from oil lamps to electricity without the least sign of fear or hostility. He does not analyze matters, but profits without questioning from labors the magnitude of which he is totally ignorant. In short, he is a fatalist whom nothing can astonish, but he is quick to see the advantage of the automobile and to familiarize himself with its working. Thus, there are already in Bombay garages hiring out cars, and it appears these never lack patronage. Speed is apparently a secondary consideration with automobile buyers in India. Cars for use in that country must have as high a clearance as possible in order to clear obstacles on the road and to be usable across fords and over flooded roads, which are very common during the rainy season. Engines with flywheels a few inches above the ground would be utterly useless. The best sellers are cars ranging in price from $900 to $1,250. Over 100 Oldsmobiles were sold in Calcutta last year by the agents of that city.

New Idea—The business men of Battle Creek, Mich., have decided upon a novel plan to attract business. Next spring 8 miles of good road will be laid in one direction out of the city, and if increase of business from that direction is apparent, a similar amount of good road will be laid next year. The business men pay for the labor and the farmers furnish the teams. At present Battle Creek is almost isolated from the surrounding country at certain times of the year, and it is to obviate this that the unique crusade will be started. On account of the impassable roads the trade often goes to other places. There is also a large number of automobile owners in the city who will be greatly benefited by the proposed improvements.

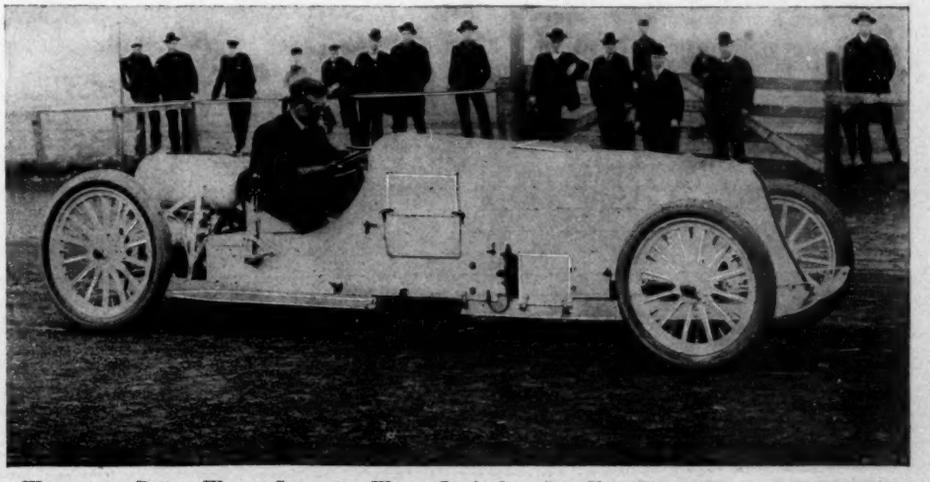
Boost in Right Place—The good roads movement in Michigan has at last culminated and in a way in which every good roads enthusiast hoped it would, but in which few really believed it would. The outcome of the wave of reform which has been sweeping the state for the last 6 months was seen in the organization, in Flint, on January 25, of the Michigan State Good Roads Association. Delegates to the number of fifty were present from eleven different counties in the state. The following officers were elected: President, Mayor W. W. Todd, Jackson; vice-president, H. W. Davis, Lapeer; secretary, Dr. Rachel J. Davison, Flint; treasurer, B. F. Ross, Ypsilanti. An executive committee and a vice-president for each county represented were also named.

Whistling Billy Bobs Up—Webb Jay's Whistling Billy, which went into the fence at Buffalo, is in commission on the coast, Bert Dingley driving the steamer in contests of all sorts in that section.

Against the Earl—Earl Russell, of England, who was nabbed for scorching and then carried the case to the higher English courts, has been turned down by the Surrey quarter sessions, which dismissed his appeal.

Time Savers—The delivery of newspapers by the Hotel and Railroad News Co., of Boston, will be done with automobiles. Two cars, which take the place of four horses and two wagons, are now in use, and the company will build and operate fifty more. The cars are the outcome of long experiments at the company's Roxbury shops. The engine is a four-cylinder vertical, developing 40 horsepower and capable of doing 35 miles an hour.

Convicts to Build Roads—From Annapolis, the capital of Maryland, comes news to the effect that a bill has just been introduced in the legislature providing for the construction of a public highway, to be known as state of Maryland road No. 1, between Washington and Baltimore, the course of which shall be, as near as practicable, along the route of the old Baltimore and Washington road. The building, grading and construction are to be under the direction of the state highway commission, and the road at no place is to be less than 30 nor more than 60 feet wide. When any incorporated town shall object to the road passing through its confines, then the commission must arrange for the road to pass around such towns. The road is to be constructed by inmates of the house of correction, but not more than 100 of them can be employed at any one time. The bill carries with it an appropriation of $40,000, and provision is made that $25,000 shall be available for use in constructing the road in 1906 and 1907. The $40,000 is to be used in buying the necessary road machinery and implements to carry on the work.



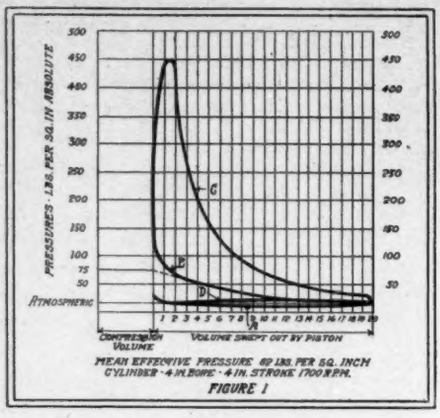
WHISTLING BILLY, WHITE STEAMER, WEBB JAY'S OLD CAR, NOW BEING DRIVEN BY DINGLEY

DISCUSSION OF SIX-CYLINDER CARS

LONDON, Jan. 25—A discussion which is attracting much attention both in trade and other motoring circles in Great Britain is that between the advocates of the four and six-cylinder motor. Briefly, the four-cylinder partisans, while inclined to admit the theoretical advantages of a six-cylinder impulse in a four-cycle engine, deny that the practical advantages are such as the six-cylinder partisans claim for them. They insist that when the constructional details of weight, productive cost, liability to error and breakdown, are duly weighed the manufacturers' verdict must come in favor of the four-cylinder; while from the practical motorists' point of view it is averred that a good four-cylinder car will do everything that a six-cylinder car can be asked to do, in this country at least.

That is the situation, and the protagonists on either side consist of S. F. Edge and his partner, Mr. Napier, for the six-cylinder design, while Messrs. Jarrott, Hutton and Rolls have championed the four-cylinder motor. One of the most cogent contributions yet made in the debate is an article from Mr. Edge. The extremely technical nature of it, however, seems to indicate that his partner, Mr. Napier, is the hand which has provided the figures and facts. Mr. Edge's article is illustrated with diagrams which are reproduced as being of interest in view of a very probable spread of the six-cylinder movement owing to the undoubtedly greater range in flexibility of the six-cylinder engine over the four at equal powers.

For the purpose of his article Mr. Edge obtained monograph diagrams from a 40-horsepower engine, and, arguing from that standpoint, he indicates that in a single-cylinder engine of that power the bore would have to be nearly 10 inches in diameter and would strike a blow at every explosion equal to a piston pressure of 22,282 pounds. A two-cylinder engine of the same power would require pistons of about 6 inches in diameter with a blow only half that of the single cylinder. A three-cylinder engine of the same power would require pistons of 5⅝-inch diameter with an explosion blow equal to 9,427 pounds. In a four-cylinder engine the


PRESSURES - LBS. PER SQ. IN. ABSOLUTE
ATMOSPHERIC
COMPRESSION VOLUME
VOLUME SWEPT OUT BY PISTON
MEAN EFFECTIVE PRESSURE 82 LBS. PER SQ. INCH
CYLINDER - 4 IN. BORE - 4 IN. STROKE 1700 R.P.M.
FIGURE 1

piston diameter of nearly 5 inches is required, and an explosion blow in each cylinder equal to 7,070 pounds. The five-cylinder engine may be put out of account—we know of none in operation. The six-cylinder would require pistons equal to about 4 inches in diameter, the explosion blow on which would be equal to 4,713 pounds. Apart from the absolutely continuous torque on the crankshaft of a six-cylinder motor the reduction in the explosion permits a lighter construction sufficient to counteract the additional weight entailed in the two extra cylinders. The more continuous impulse would theoretically admit the abolition of the flywheel, but practically merely justifies a great reduction in its weight. This effect bears right through the whole construction of the car down to the tires. In theory, at any rate, the six-cylinder designer is entitled to claim that his car must be more economical in upkeep than the four-cylinder.

In figure 1 the vertical line is graduated to give cylinder pressure in pounds per square inch. It shows, by line B, that compression is carried to about 75 pounds per square inch. The suction stroke is represented by the line A and the exhaust stroke by the line D. Just after the piston has passed its dead center on the explosion stroke, the maximum force shown —450 pounds per square inch—is attained, which is equivalent to a blow of nearly 2½ tons. In a four-cylinder engine of the same power this blow would be nearly 3¾ tons. It is difficult for the ordinary motorist to understand all the niceties of an indicator diagram such as printed. This arises from the fluctuations of pressure behind the piston and due to the fact that the reciprocating parts, such as pistons, connecting rods, etc., are traveling at constantly varying velocities. This fluctuation necessitates a considerable amount of power to overcome inertia through the first half of each stroke, which is, to an extent, returned in momentum during the second half of the stroke. It is therefore only at each dead center and at midway points between these that the torque on the crankshaft is affected by the action of the reciprocating parts of the engine. Their effect theoretically has to be added to or deducted from the varying pressures behind the piston and so alters the comparative results of an indicator diagram as apart from a torque curve. It is in the endeavor to eliminate these influences that the flywheel is an integral part of the motor as it is on the power stored up in the flywheel upon which must be depended to maintain as near as possible an equal angular velocity in the crankshaft.

Figure 2 is the basis of the curves plotted out in figures 3 and 4, since the torque of the four or six-cylinder engine is merely that of an equivalent number of single-cylinder engines superimposed on the same crankshaft. It is necessary when regarding these diagrams to remember that all the forces tending to turn the shaft in the direction of power are plotted above the 0 line, while those of the negative character are plotted below. The 0 line in figure 1 is shown in the diagram, the 0 line in the others is the base line. It is not fair to compare these two latter diagrams, for the cylinders, being all the same size, the six-cylinder engine will be giving one and one-half times the power of the four, and, therefore, each vertical height of the dotted figure has been increased one and one-half times to the full line, corresponding to larger pistons to equalize the powers of the two engines.

The most important point to be noticed is that with six cylinders there is always a positive turning effort of at least 700 inch-pounds on the crankshaft, and at no point of the cycle does it approach 0. With

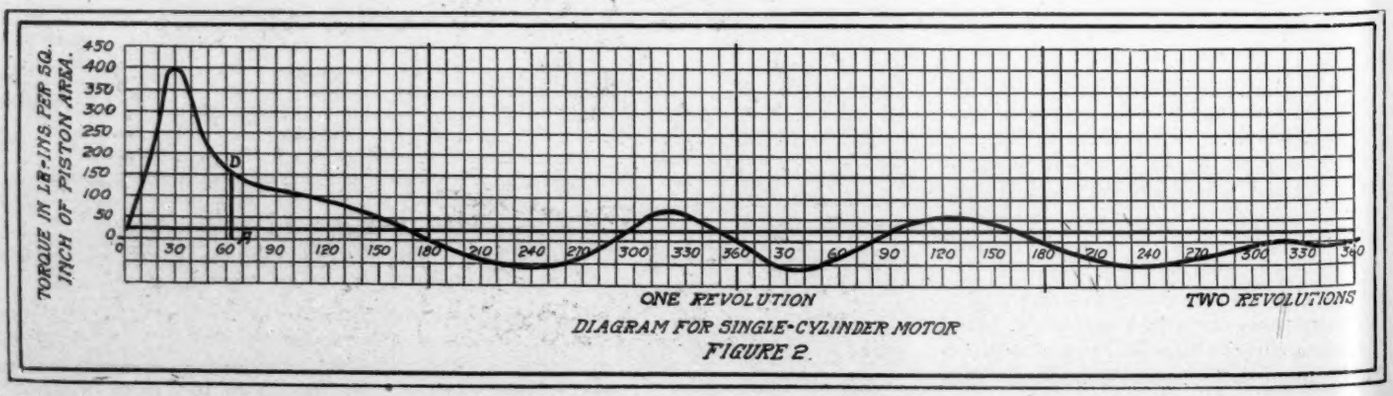


DIAGRAM FOR SINGLE-CYLINDER MOTOR
FIGURE 2.

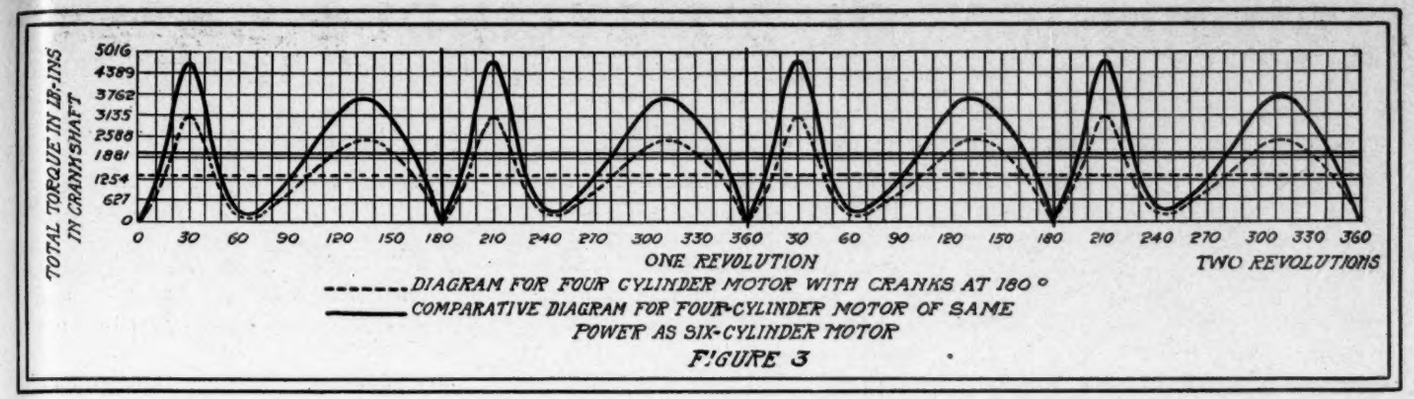

TOTAL TORQUE IN LB-INS IN CRANKSHAFT
5016
4389
3762
3135
2588
1881
1254
627
0
0 30 60 90 120 150 180 210 240 270 300 330 360 30 60 90 120 150 180 210 240 270 300 330 360
ONE REVOLUTION
TWO REVOLUTIONS
DIAGRAM FOR FOUR CYLINDER MOTOR WITH CRANKS AT 180°
COMPARATIVE DIAGRAM FOR FOUR-CYLINDER MOTOR OF SAME POWER AS SIX-CYLINDER MOTOR

FIGURE 3

four cylinders, the cranks at 180 degrees, there must of necessity be four points in the cycle—when the cranks are on the dead centers, at which there can be no turning effort. Figure 3 shows also four other points where the torque has only a very small positive value, namely, less than 300 inch-pounds. This is accounted for by the retarding force of the pistons when being accelerated, after the effect of the explosion has passed. The next rise in the torque is due to the forward pressure of the pistons when nearing the end of the stroke. A comparison of the two diagrams will be far more convincing than anything that can be written about them. The total inch pound pressures are given for convenience. One factor which has not been taken into account in the construction of these diagrams is the variation of pressures in the crankcase. Obviously the pressure behind the piston in a fast-running engine cannot remain constant. On the down stroke it will be higher, and on the up stroke it will be lower than atmospheric. The disturbing effect which this has on the torque is all in favor of the six-cylinder engine, for two reasons: First, the four-cylinder engine must have larger cylinders, on which the effect will be more apparent; and, second, in the six-cylinder engine the small effect will be reproduced six times as compared with four times that the large effect is produced in the four-cylinder engine.

Perhaps the simplest method of indicating the relative evenness of torque in the one, four and six-cylinder motors is shown in figure 5, which is a diagramatic comparison of the three types, based on the particulars of the torque diagrams. The height of each rectangle denotes the relative unevenness of the returning movement in the crankshaft, and the widths of each rectangle represents the relative time interval between each cylinder impulse. The vast difference between the single and the four-cylinder motors in these respects will be noticed, and the comparatively unimportant differences in the same way between the four and six-cylinders. The

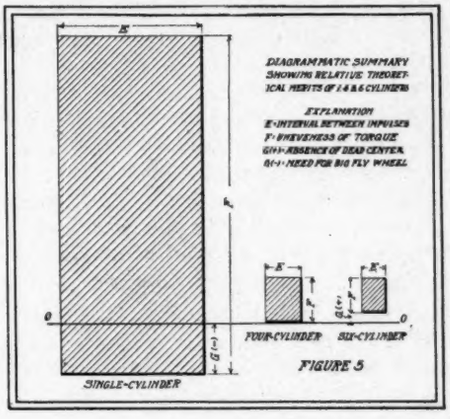


FIGURE 5

most important dimensions, however, in this diagram are the relative positions of the rectangles to the line 0. The distances of the six-cylinder rectangles above the 0 line indicate the continuousness of the turning movement, showing that there is no dead center. In the case of the four-cylinder motors it will be seen that it rests on the 0 line, indicating that there is a dead center and a necessity for a flywheel, while the portion of the diagram in the single-cylinder below the line indicates the absolute necessity for a fairly large flywheel.

While there are few makers who claim to have any idea of attempting to enter the six-cylinder field, it is nevertheless a fact that the topic is being seriously considered not only by the motorists and theorists, but by many automobile makers and engineers. A number of British makers may yet produce six-cylinder cars another season.

CAR PREVENTS A LYNCHING

Philadelphia, Feb. 3—Had it not been for the automobile Philadelphia might have had the odium of a lynching on her fair 'scutcheon. On Wednesday last Rufus Johnson, who murdered and outraged Florence Allinson at Mount Holly, N. J., was brought from Baltimore to the scene of the crime. It was necessary to convey the prisoner from Broad street station to the Market street ferries, and although efforts were made to keep the fact a secret, several thousand people assembled at the station to have a look at the brute. Fortunately some bright mind had thought of an automobile, otherwise Johnson would hardly have reached the ferry alive. As it was, it required a large force of the finest to get him into the tonneau, and away flew the car down Market street.

At the ferry another crowd was in waiting, but by that time Johnson was in the bottom of the car covered by a blanket, and the mob was in doubt as to which of the three or four cars waiting for the boat held his precious carcass. At Mount Holly another attempt at lynching was feared, but the gates were thrown open and the car shot in before the crowd realized what was happening.

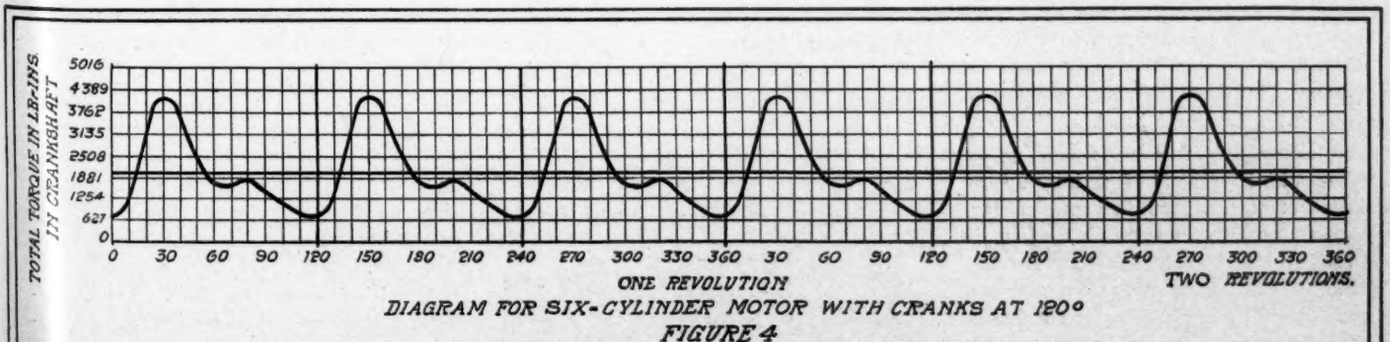


FIGURE 4

BRIEF BUSINESS ANNOUNCEMENTS

Boston—Fred H. Adams has resigned the New England agency for the Atlas truck.

Brooklyn—Charles F. Batt, of 1378 Bedford avenue, has secured the local agency for the Moon.

South Norwalk, Conn.—L. M. Wright's new brick garage, 63 feet by 61 feet and three stories in height, is now completed and ready for business.

Indianapolis—A company has been organized for the manufacture of chimes. It will be known as the Auto Chimes Co. and will be managed by the D. B. Sullivan Co.

Pittsburg—L. G. Martin has his new building at 3921-23 Forbes street about completed and expects to occupy it in a few days. Mr. Martin is the local representative for the Rambler.

Albany, N. Y.—The Witherbee Igniter Co., of New York, will shortly open a distributing branch in this city. The agency has been given to the Automobile Equipment Co., of 260 Jefferson avenue.

Albany, N. Y.—A number of West End business men are interested in a proposition to erect an automobile factory. Several sites are being considered, but no plans have been definitely made at present.

Salt Lake City, Utah—A Seeing Salt Lake City automobile company has been organized under the management of L. C. Snow. A route of about 20 miles has been laid out and a charge of $1 per passenger is to be made.

New York—B. E. Fulton, who for the past 3 years has been assistant manager of the Pope company's New York branch, has resigned his position and is now general manager of the Mercedes Import Co., with headquarters in the Times building.

East Liverpool, O.—The East Liverpool Automobile Co. will handle the White steamer and the Mitchell gasoline car. The new company takes over the business of H. H. Knowles. The officers are: H. H. Knowles, president and treasurer; A. M. Knowles, vice president, and Harold Marshall, secretary.

New York—A new foreign car, called the Comet, with a 35-horsepower engine built by Barricaud and a body by Belvalette, which has been designed particularly for American roads, will shortly make its appearance in New York. Count de Barres, of the St. Paul hotel, is the company's representative in this country.

Newark, N. J.—The J. M. Quinby Co., of 27 Division street, manufacturer of carriages, harness and automobile bodies, is meditating considerable additions to the plant as soon as the necessary property can be purchased. A large three or four-story brick building will probably be erected, which will be used chiefly for the manufacture of bodies. More room also will be added for the other departments.

Lowell, Mass.—The Lowell Automobile Co. has taken an agency for the Buick car.

Detroit—Charles E. Miller will shortly open an automobile supply retail salesroom at 229 Jefferson avenue.

Detroit—John P. Schneider, who has been handling the Pierce, Pope-Toledo and Columbia machines, has now added the full line of Oldsmobiles.

New York—E. B. Jackson, general manager of the Chadwick Motor Car Co., has opened his new salesrooms at 1621 Broadway, near Forty-ninth street.

Bay Shore, L. I.—The automobile garage and repair shop of John Finklestien on West Main street was almost destroyed by fire. The damage, however, was confined to the machinery.

New York—Arthur Fischer has sold to the New York Cab Co., 268 West Fortieth street, a three-story dwelling house. The buyer owns the adjoining plot and will erected a stable and garage.

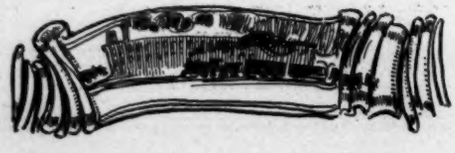
New York—Walter Austin, representing the Austin Automobile Co., of Grand Rapids, has closed a deal with Frank A. Sanford to handle the Austin line exclusively. Sanford will locate at 1843 Broadway.

Brooklyn—Joseph D. Bourk, of the Cadillac company, has been appointed manager of the new branch at 1001-1003 Bedford avenue, which will be opened about March 1. The new plant will consist of a salesroom and repair shop.

Philadelphia—The old metal stool factory which was seized for back taxes by Pleasantville borough has been redeemed, the owners giving the borough a check for $2,000. It will be converted into an automobile factory and give employment to several hundred hands.

Hartford, Conn.—The West Indies Transportation Co., which was organized under Connecticut laws, and whose corporate headquarters are at Hartford, held its annual meeting in this city this week. Thomas Malcolm, of Hartford, was elected president. The company operates lines of automobile buses in Cuba.

New York—Malcolm C. Anderson, Halcoot Anderson, Henry L. Scheurerman and George E. Armstrong have resigned as directors of the Diezemann Shock Absorber Co., and Sam Fisher, Henry Fisher and Isidor Springer and Adolph Boskowitz have been elected directors to fill the vacancies. Sam Fisher has been elected president of the company.



Cleveland—The new plant of the Baker Motor Vehicle Co. on Berea road is nearing completion.

Boston—Walter Woods, for some years connected with the White company, has joined forces with B. F. Blaney, of the Corbin.

New York—The Goodyear Rubber and Tire Co., formerly at 253 West Forty-seventh street, has established itself at 1914-1916 Broadway.

Philadelphia—The Foss-Hughes Motor Car Co., agent for the Pierce-Arrow, Cadillac and Baker electric, opened its new salesrooms at 201 North Broad street.

Baltimore—Oliver Light, formerly salesman for the Cadillac Automobile Co., has taken the local agency for the Oldsmobile. Associated with Mr. Light is ex-Fire Chief Charles D. Purroy.

Albany, N. Y.—Christopher P. Weeber has purchased property on Central avenue and Bradford street and will erect an automobile factory. Ground has already been broken for the new building.

Indianapolis—Agencies for the Queen and Mitchell for 1906 have been placed with the D. B. Sullivan Auto Co. This company had the Queen last season, but the Mitchell is a newcomer in the city.

Boston—W. E. Eldridge, of the Buick agency at the Tremont garage, has opened a branch for this car at 182 Market street, Lynn. It is in charge of N. L. Ruch, formerly with Alvan T. Fuller and with the local branch of the Pope Co.

Hartford, Conn.—The Harriman Motor Works, Inc., has leased a factory in Glastonbury and will use it as a branch plant. It is being equipped with special machinery and will be used for the manufacture of small motors in connection with the company's business here.

Detroit—A new garage, show and salesroom will shortly be opened at Woodward and Alexandrine streets. Jack Brady, agent for the Peerless and the Autocar; Billy Neumann, who handles Welsh and Soules, and Grand Brothers, who look after the interest of the Buick and Thomas, will all have quarters in the new building.

Boston—Though the Motor Mart is not yet completed, it has already become an automobile center. Besides the Adams-Sutton Co., agent for the Oldsmobile, which took up its quarters last week, the Waltham Motor Car Co., represented by Robbins Brothers, is now domiciled in the new structure. This company has a corner store with frontage on Park avenue. Adjoining it is the salesrooms of the Curtis-Hawkins Co., agents for the Grout. Others are coming in later.